Software of project skills assessment based android for kinetic theory of gases and thermodynamics

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Abstract. Assessment in the 2013 curriculum in terms of three aspects, that is assessment of attitudes, knowledge and skills. Skills assessment has several assessments that is performance assessment, portfolio assessment, product assessment and project assessment. Project assessment is comprehensive because it can assess from all aspects of the assessment. The fact is found in the school that teachers have not used technology in assessing the learning process. So that it takes a long time to assess and assign project assignments that are not yet optimal. One effort that can be done is to create a software of project skills assessment that contains project assessments to assist teachers in the learning assessment process on basic skills competencies that include project assignments given to students. The purpose of this study was to produce a valid software of project skills assessment on the kinetic theory of gases and thermodynamics. This type of research was R&D (Research and Development). The object of this research was the software of project skills assessment. The data collection instrument was carried out with a validation questionnaire sheet. The data analysis technique used is descriptive statistics. Based on data analysis, the software of project skills assessment named Project Valuer has been validated by experts in terms of five components, that is software content, language, software display design, software engineering, and visual communication obtained by an average percentage the validation value with very high criteria. This means that the software of project skills assessment based android for kinetic theory of gases and thermodynamics is valid.

1. Introduction
There are many potential uses of technology in education, including to improve access to education, increase efficiency, and the quality of learning and teaching. Technology can be applied innovatively at all stages of teaching and learning activities, starting from making learning plans, preparing materials, presenting material, implementing learning to assessment [1]. Assessment is an activity of gathering evidence that is carried out deliberately, systematically and continuously and is used to assess the competence of students who are expected to become meaningful information in decision making[2]. Implementation of learning is inseparable from assessment and not all forms of assessment will match the material or competence to be achieved. As much as possible, the assessment will include attitudes, knowledge and skills competence [3]. One type of assessment that is quite comprehensive covering the
three domains is project appraisal. Project assessments provide opportunities for students to optimally develop their abilities in understanding concepts to applications and even creating.

Projects are learning tasks which include project design, implementation and reporting in writing or orally within a certain time. Project assignment is implemented with project-based learning steps including; 1) determining project tasks, 2) designing project work steps, 3) preparing project implementation schedules, 4) completing projects with teacher monitoring, 5) preparing reports and project presentations and 6) evaluating projects and project results. The instrument used is a rating scale equipped with a rubric. Rubric is a criterion that shows performance, and the aspects to be assessed[4].

The use of technology is growing rapidly in all areas of life, one of which is in the field of education. Technological developments that affect system design must be able to assist humans in their activities[5].

Based on observations at schools that the implementation of the assessment is done manually or has not utilized technology that requires a long time to assess and assign student project assignments that are not yet optimal. One of the technologies that can make a device is Android Studio, which is an application that can make an Android-based device using the Java programming language. The application program is a solution to problems in the world of education, because it can transcend boundaries, space and time. Its integration is getting stronger during the globalization era of technology, which can become a means of delivering education in Indonesia. Solving these problems is one of the interests of educational technology. Currently there are many software available on the Internet that are used as a tool that allows teachers to complete their work efficiently[1].

The Android operating system type of mobile device shows the rapid development starting from among children, adolescents, and parents who already have an Android mobile device in the form of a smartphone or tablet[6]. By utilizing technological developments, it can support the appraisal process for a given project task. The purpose of this study was to produce a valid software of project skills assessment on the kinetic theory of gases and thermodynamics.

2. Research Methods
Type of research used is Research and Development using the ADDIE model in figure 1. The ADDIE model is a learning design model that is based on an effective and efficient system approach and an interactive process, namely the results of the evaluation of each phase can bring learning development to the next phase. The end result of one phase is the initial product for the next phase.

Figure 1. ADDIE Model [7]
Analysis of the needs of learning physics at SMAN 1 Padang was obtained based on the analysis of the results of valid questionnaires. The value of the questionnaire validation was 88.25%. A flowchart in figure 2 is part of the design stage.

![Figure 2. Design of Software](Source: [8])

At the development stage the validity of the product was tested, in which the product validity test instrument had been validated with 77% validation results. The data analysis technique used is descriptive statistics which analyze the data by describing or describing the data obtained [9]. The data obtained is presented as a percentage on a chart and described.

3. Result and Discussion

3.1. Result

3.1.1 Result of Product Design

The software of project skills assessment has an icon and a name, that is project valuer. Here are some screenshots from the software based android who can be seen in Figure 3.
3.1.2. Result of Product Analysis

The software of project skills assessment that has been made is validated by experts who are physics lecturers by using a valid questionnaire sheet. The software of project skills assessment was validated by three validators. The components assessed from the application are (1) application content / outline, (2) language, (3) application display design, (4) software engineering and (5) visual communication.

Content components or outline application that will be assessed by the expert consist of six indicators, namely: 1) Adherence of content coverage, 2) Clarity of application development objectives, 3) Input process, 4) Access to output after inputting, 5) Suitability of the number of outputs with indicators on the assessment, 6) Reporting system / output on the application. The results of the assessment of the content components or outline application that will be assessed by experts can be plotted into graphs. On the x-axis is the content component indicator application outline and on the y-axis there is a percentage of the indicator value obtained. The results of the content data plot application outline can be seen in Figure 4.
Based on the chart, the percentage value range for the content component (application outline) is 83% to 100% with an average value of 88%. This shows that the application of the project skills assessment to the content component (application outline) is valid. This component contains three indicators, including: 1) Readability, 2) Clarity of terms used and 3) Conformity with good and correct Indonesian language rules. The results of the validation data analysis plot for each indicator in the language component can be seen in Figure 5.

Based on the chart of the validation data plot on the language component in Figure 5. The percentage of validation values is in the range of 75% to 92% with an average value of 86% and is in the valid category. This component consists of three indicators, namely: 1) Layout of inputs, buttons and outputs, 2) Suitability of application design and 3) Selection of icons and buttons. The results of the data plots from the validation analysis on the application display design components can be seen in Figure 6.
Based on the chart, it can be seen the percentage of values in the range of 83% to 92% with an average of 89% being in the valid category. This component consists of four indicators including: 1) Application file size, 2) Installation process, 3) Login process, 4) Application operation. The results of the software engineering component analysis data plot can be seen in Figure 7.

![Figure 7. Analysis Chart of Software Engineering](image)

From the chart in Figure 7, it can be seen that the validity value is in the range of 83% to 100% with an average of 92% being in the valid category. This component has four indicators, namely: 1) Instructions for application use, 2) Application usage, 3) Application ideas and ideas and 4) Suitability of logo / icon selection in the application. The plot of the results of data analysis can be seen in Figure 8.

![Figure 8. Analysis Chart of Visual Communication](image)

Based on the graph in figure 8, it can be seen that the visual communication component is in the percentage value range of 83% to 100% with an average of 92% being in the valid category. The result of validation product can be seen in Figure 9.

![Figure 9. Validity of Application](image)
Based on the above results, the average of the five components of the project skills assessment application validation can be seen in Figure 9. Of the five components, the percentage ranges from 86% - 92% where all components are in the valid category.

3.2. Discussion

Applications that have been designed and created are named "Proval", namely the Project Valuer. There are several validation components that are assessed including content or outline application, language, application display design, software engineering and visual communication. A product can be said to be valid if the product made is in accordance with the structure being guided. Based on the validation that has been carried out by experts for the application of project skills assessment on the content component (application outline). In the results obtained, the content coverage in the application is appropriate and the goal of application development is 92% in the high category. There are several aspects to assess or evaluate instructional media, one of which is the aspect of content, whether it is appropriate and the initial purpose of making the program [10]. Application generally have an input and output process. The information system consists of input, process, and output where in the process there is a reciprocal relationship with two elements, namely system performance control and data storage sources, both letters and numbers. In this data it is processed using certain methods which produce output in the form of information. The information generated can be in the form of a report or report or a solution of the process that is being carried out [11]. Applications that have been developed have an input process that is related to the output results in the application. Thus, the application of project skills assessment on the content component is in the valid category.

In the linguistic component, the assessment of project skills appraisal application validation is in the valid category. The language aspect is one aspect of the feasibility of a median [12]. The linguistic component includes legibility, clarity of information, conformity with good and correct language, the language used is clear and concise. The application is assessed from three linguistic indicators, namely: readability, clarity and language suitability. The readability indicator gets a percentage value of 75% which is lower than the other indicators. because the application does not yet represent the descriptor of the readability indicator [1]. One of the descriptors of the readability indicator is an illustration and the size of the content must be proportional [13].

The feasibility of a media has aspects that are assessed for application display, namely: 1) interface aspect, because product display is very important, multimedia learning developers must pay attention to writing text, animation and graphics, audio, and video, 2) navigation aspects where navigation must be made easy and as clear as possible so that users have no difficulty accessing the program and must be consistent [12]. In the application display design component, the assessment of the project skills assessment application is in the valid category. Based on this, the project skills assessment application already has an input, button and output layout, the suitability of the application design, and the selection of buttons and icons that represent the description of the descriptor, which is precise, regular, interesting and consistent.

One scope of software engineering is software testing which includes testing the overall software behavior [14]. In the software engineering component, the assessment of project skills assessment applications is in the valid category. Based on this, the project skills assessment application has a small file size, fast install process, easy login process and good operation.

Visual communication aspects are seen from several indicators, namely communicative, creative and visual form / icon selection. The project skills assessment application has clear instructions for using the application, users can use the application properly, ideas and ideas on the application, and the selection of a logo / icon that is appropriate [15]. Based on this, the application of project skills assessment on the visual communication component is in the valid category. The validity of the application of project skills assessment in general, in terms of five components, namely content or outline application, language, application display design, software engineering and visual communication are at very high criteria which means valid or suitable for use.
4. Conclusion
Based on the data, data analysis and discussion that has been presented, it can be concluded that the project skills assessment application called "Project Valuer" has been validated by experts in terms of five components, that is content or outline application, language, application display design, software engineering, and visual communication obtained an average percentage value of validation with very high criteria. This means that the project skills assessment application is valid.

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