

Development of Android-Based Learning Media Applications on Thermochemical materials for Class XI Senior High School Students

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Abstract:

The rapid development of technology allows the role of technology to be needed in the learning process. Technological developments can be an opportunity in developing learning ideas and innovations, one of which is by creating Android-based learning media. The development of android-based learning media is considered to be able to make it easier for students to learn anywhere and anytime. The type of research used is Research and Development (R&D) using the Plomp model developed by Tjerd Plomp. The Plomp model consists of three stages, namely preliminary research, prototyping phase, and assessment phase. This research is limited to the prototyping phase, namely the validity test. The validity test was carried out on two lecturers from the Chemistry Department, FMIPA UNP, and three chemistry teachers at SMAN 7 Padang as material experts, and three technology lecturers from the UNP Engineering Department as media experts. The results of the validity of the material experts obtained by the analysis of the Aiken'V formula show that the application is valid with a value of 0.877, while the results of the validity of the media experts obtained show a value of 0.93 with a valid category.

Keywords — Application, Learning Media, Android Based, Thermochemical

I. INTRODUCTION

Education is a major part of the formation of quality human resources. The world of education cannot be separated from the learning process which includes three things, namely teachers, students, and the environment. The world of education is also inseparable from advances in information technology [5]. Advances in information technology accompanied by the internet have had a huge impact. One of the benefits of advances in information technology accompanied by the internet is to find the most up-

to-date information. The development of technology is increasingly rapid, the role of technology may be needed in the teaching and learning process to achieve learning objectives to get better results [7].

In the learning process, teachers are required to be able to create a learning process that is more understandable and attractive to students. Especially during this pandemic. Along with the outbreak of the 2019 Coronavirus, the learning process in the world of education has changed. [8] states that the spread of the Covid-19 outbreak has made the learning process shift to distance learning

or online (online). In this case, teachers need to create suitable and appropriate learning media for online learning today.

Learning media has the meaning of a tool that is used to send messages from the teacher to students so that it can stimulate the thoughts, interests, attention, and willingness of students so that the learning process can be carried out to achieve learning objectives [7]. Interesting learning media are expected to be able to attract attention, stimulate the mind to learn and provide motivation to students to be more active in the learning process through the material provided.

Based on 2013 revised 2018 curriculum, Thermochemistry is one of the chemistry subject matter for class XI IPA SMA/MA.

The results of the questionnaire stated that the existing learning media had not been able to make students learn independently and actively participate in the learning process. Therefore, learning media is needed that can make students learn independently and participate actively in the learning process. One of the learning media that can be used as a good alternative is an Android-based learning media application. This application can be developed in such a way as to meet the needs of teachers and according to the characteristics of students when learning. The android-based learning media application that will be developed is expected to be able to make students active and independent in learning, especially during online learning, because in this application there are features in the form of material where students can find concepts based on the key questions provided, practice questions in which there are discussions, along with learning videos that can support student understanding that can be accessed independently. In addition, in the application, there are also sounds, and images that support this application so that it looks interesting.

Utilization of android-based learning media applications can be applied to see the use of android so far that is not optimal to support the learning process. The manufacture of learning media using android applications has been carried out by [10]

and Sari (2015) with the successive titles of android-based learning media applications on electrochemical material and electrolyte solutions and non-electrolyte solutions. [9] also developed learning media with the title IT-based learning media application for Thermochemistry material. The difference between the three studies above lies in the application used. From these three studies, it is stated that the development of android-based learning media has a level of validity and practicality besides that android-based learning media can also improve student learning outcomes so that it is suitable for use as learning media.

II. METHODOLOGY

This research will be conducted in the 2021/2022 academic year at FMIPA UNP and SMAN 7 Padang. The type of research conducted is Research and Development (R&D) with the Plomp development model. The Plomp development model consists of 3 stages, namely preliminary research, prototyping phase, and assessment phase. The preliminary research stage aims to find information related to learning media used in schools. Meanwhile, in the prototyping phase, the activities carried out to design and evaluate the application of learning media will be tested for validity [3]. This research is limited to the prototyping phase, namely the validity test.

The subjects of this research are validators and students of class XI SMAN 7 Padang. The research instrument used was a validation questionnaire sheet. Data from the questionnaire was processed using the Aiken V scale.

III. RESULT AND DISCUSSION

A. Result

The result of this research is an android-based learning media application product on thermochemical material which was developed using the Plomp development model.

B. Discussion

The Plomp development model consists of 3 stages, namely preliminary research, prototyping

phase, and assessment phase. The explanation and results of the three stages of development can be described as follows:

1) Preliminary Research Stage

At this stage, the activity began by distributing questionnaires to 6 chemistry teachers at SMAN 1 Padang, SMAN 7 Padang, SMA Adabiah 2 Padang, and SMAN 16 Padang. Then fill out a questionnaire by 30 students in each school. Questionnaire sheets for teachers and students contain questions about the learning media used in the learning process.

The results of distributing questionnaires to teachers obtained information related to learning media, including (1) Learning media used by teachers were still in the form of printed books, LKPD, PPT, and learning videos (2) The combination of learning media with electronic devices and application sites that had been used had not made participants students learn independently and participate actively in the learning process besides the previous use of media has not been maximized because it is limited to some materials and internet data, (3) teachers have difficulty in correcting assignments and evaluating students. (4) teachers want to learn media innovations in the form of audio and video, media for strengthening questions, concept discovery, can be used anytime and anywhere, and can be used in internet connection or not, (5) teachers have an interest in using learning media in form of application in the learning process because it can add to the learning experience of students.

The results of the questionnaire to students obtained information including (1) students stated that their teaching materials were in the form of printed books, LKPD, PPT, and Learning Videos. In printed books, the LKPD and PPT used have not been able to make students learn independently, and the media has not been able to attract the attention of students to learn (2) students stated that android has not been maximally used in chemistry learning, (3) most of the students have never learned to use

android-based learning media, (4) students need interesting and easy-to-understand learning media, (5) students need learning media that have audio and video, can be used anywhere and anytime and can be used on a network or not. Based on the results of the needs analysis, an Android-based learning media application was developed. Based on the above problems, an Android-based learning media is needed.

At the context analysis stage, the basic competency curriculum analysis activities of thermochemical material in the chemistry learning syllabus in the 2013 curriculum are carried out as follows: 3.4. Explaining the concept of the enthalpy change for reactions at constant pressure in thermochemical equations. 3.5 Explain the types of reaction enthalpy, Hess's law, and the concept of bond energy.

Based on KD 3.4 and KD 3.5, learning indicators can be formulated on the subject of Thermochemistry as follows: (1) Identifying systems and environments, (2) Distinguishing exothermic and endothermic reactions, (3) Explaining the relationship of energy, heat, and work. (4) Writing thermochemical equations, (5) Explaining three types of standard enthalpy changes, (6) Explaining the concept of a calorimeter, (7) Explaining the concept of Hess's Law, (8) Explaining the concept of bond energy.

The literature review aims to find references in developing learning media. The results obtained from a literature review, namely the manufacture of learning media using an android application have been carried out by [10] with the results obtained in the form of an android-based learning media application on electrochemical material and Sari (2015) with the results of an android-based learning media application on electrolyte solution material and non-electrolyte solution. From these two studies, it is stated that the development of android-based learning media has a very high level of validity and practicality so that it is suitable for use as learning media.

The concept analysis stage has been carried out by analyzing the concepts contained in the thermochemical material. The thermochemical material in the 2013 revised 2018 curriculum is taught in class XI in the odd semester. The concept of thermochemical material is analyzed from KD 3.4 and KD 3.5

2) Prototyping Phase

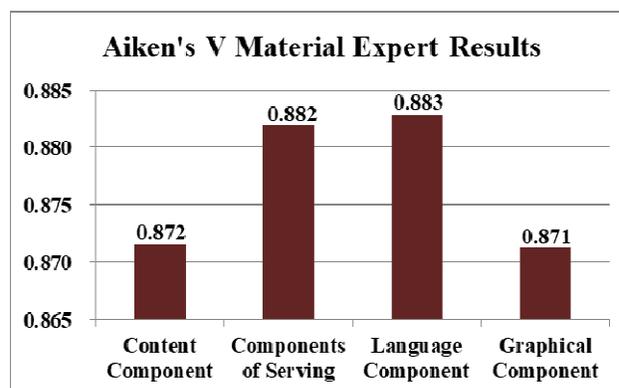
The prototyping stage in this study is limited to the validity test stage. The learning media application that has been developed was validated by two chemistry lecturers from the UNP Chemistry Department, three technology lecturers from the UNP Engineering Department, and three chemistry teachers from SMA Negeri 7 Padang.

The first activity is the formation of the prototype I. The prototype I am the application of learning media on thermochemical material.

Self-evaluation activities are carried out to see and correct parts or components of the learning media application. Based on the self-evaluation questionnaire sheet, all components of the formulated learning media application are already contained in the Android-based learning media application so there is no need for revision. After prototype II was produced, then a formative evaluation was carried out in the form of expert judgment and one-on-one trials.

Expert assessment in the form of validation of the android-based learning media application. Product validation activities are carried out by several experts or experienced experts to assess the weaknesses and strengths of the products produced. There are four components of validity that are assessed by the validator, including content components, presentation components, linguistic components, and graphic components [1]

Graph 1 of expert validity of learning media application materials using scala Aiken's V.



Based on the data in graph 1, it shows that the material expert validation average

Content component assessment is an assessment of the product developed based on the relevant curriculum. In the assessment of the content components, the learning objectives and the material being taught to the application made are suitable. Based on the results of data processing, it shows that the application of learning media in terms of the feasibility of the content components is valid with a value of $V = 0.872$. This data reveals that the learning media application that has been developed is following the current curriculum, namely 2013 revised 2018 curriculum which includes basic competency demands (KD) and competency achievement indicators (GPA). This is following the opinion of [4] that teaching materials can be said to be valid if they are by the existing curriculum. In addition, the application that has been developed has the correctness of the material, the suitability of the practice questions with the material, and the application of learning media can increase students' knowledge.

Component of serving assessment (presentation component) is an assessment carried out to show internal consistency between the components contained in the product. In the assessment of construct components, there is a systematic arrangement of the applications made and the stages contained in the application. Based on the results of data processing, the presentation component of the learning media application was declared valid with a value of $V = 0.882$. These

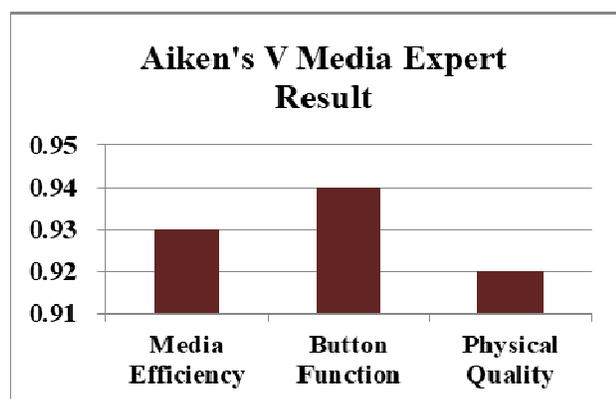
data indicate that the application of learning media that has been developed has been systematically arranged with elements of learning media.

Assessment of the linguistic component is an assessment carried out on the language used in the application. Based on the results of data processing the linguistic component of the application is declared valid with a value of $V = 0.883$. These data indicate that the application of learning media has been developed using communicative language and does not cause confusion. Teaching materials must be prepared using clear and easy-to-read sentences and language [2].

Graphical assessment is an assessment of the appearance and design of the application. Based on the results of data processing, the graphic component of the e-module is declared valid with a value of $V = 0.871$. This data shows that the application is presented well, namely, the application can be observed, the layout, type, and size of the letters, and the overall display design is considered good and attractive.

Based on the results of data processing for all components of the validity of the material expert, it shows that the android-based learning media application on thermochemical material is valid with a value of $V = 0.877$.

Graph 2 of the validity of the media expert learning media applications using scala Aiken's V.



Based on the graph 2, it is known that the media efficiency component has a value of $V = 0.93$, the function button component has a value of $V = 0.94$, and the physical quality component has a value of $V = 0.92$.

Based on the results of data processing for all components of the validity of media experts, it shows that the android-based learning media application on thermochemical material is valid with a value of $V = 0.93$.

The next stage was a *one-to-one evaluation* with three students through a one-ton one-evaluation questionnaire. One-to-one evaluation activities aim to see the attractiveness, clarity, and errors of the application. Based on the results of the interview, it was obtained that the application has an attractive appearance and there are no fatal errors. The choice of type, font size, and use of language that is easy to understand, and the stages of guided inquiry learning are clear.

This expert assessment activity and one-to-one evaluation resulted in a prototype III which was already valid.

IV. CONCLUSIONS

The results of this study indicate that the results of material expert validation are 0.877 with a valid category and the results of media expert validation are 0.93 so that the android-based learning media application on thermochemical material for senior high school is declared valid as a whole. So the researchers suggest that this android-based learning media application can be used by teachers in learning activities.

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