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# *Development of Android Based Instructional Media Application on The Fundamental Chemical Laws Topic for Class X SMA/MA*

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**Abstract— Android-based learning media application is a technology that utilizes smartphones with the android platform. This product can be developed to meet the needs of teachers and students when learning online. This study aims to develop an android-based learning media application on the fundamental chemical laws topic and determine the level of validity. This research is included in the research and development category or also known as R&D (Research and Development) with the development model to be applied, namely the plomp development model. Plomp has three stages including preliminary research, development or prototyping phase and assessment phase. Researchers limit the research to be carried out to the development or prototyping phase, namely to produce prototype III. Data collection was carried out using a validation questionnaire and a one-to-one evaluation questionnaire. Validation was carried out by seven validators, namely by four material experts and three media expert validators. The data analysis technique uses Aiken's V. The results of the product validity test have Aiken's V (V) with valid categories, namely 0.998 from material experts and 1.00 from media experts. Thus the android-based learning media application is said to be valid as a chemistry learning medium to learn the fundamental chemical laws topic. It is hoped that this android-based learning media application can increase student activity in the learning process and help students in the discovery and consolidation of concepts.**

**Keywords— Instructional media, application, android, fundamental chemical laws, Aiken's V**

## I. INTRODUCTION

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Currently the quality of education is experiencing challenges from the impact of the outbreak of the Corona Virus Disease 2019 (Covid-19). Therefore, a circular letter number: 36962/MPK.A/HK/2020 was issued as an effort to deal with Covid-19, especially in the world of education from the Minister of Education and Culture of the Republic of Indonesia. Regarding the appeal on March 17, 2020 as a prevention of the spread of Covid-19, namely regarding the implementation of the online learning process (in the

network) and doing work from home [1]. This appeal was made to reduce physical interaction as an effort to prevent the spread of Covid-19. Then the Ministry of Education and Culture reissued a letter regarding the implementation of education policies in the emergency period of the spread of Covid-19, namely circular letter number 4 of 2020 [2].

Changes in conditions in the world of education that occur suddenly should not interfere with the learning process. Therefore, it is necessary to make a breakthrough so that the learning process can continue well and optimally as an effort during the pandemic. Distance Learning (PJJ) or the virtual learning process is an alternative that is currently being carried out as a solution in adjusting to situations and conditions. Besides that, learning media is also needed that is suitable for these situations and conditions. During this pandemic period, the selection of the right learning media has the aim of obtaining good results and in accordance with existing conditions and needs.

One of the chemistry materials for class X students is the fundamental chemical laws topic. In the fundamental chemical laws topic there are basic concepts. These basic concepts must be understood by students before exploring other concepts in chemistry such as thermochemistry, chemical equilibrium, and reaction rates[3]. So that students must understand on the fundamental chemical laws topic in order to assist in learning the next material. Meanwhile, Mardani stated that in the chemistry subject the fundamental chemical laws topic is included in the category of difficult material. Therefore, to assist in understanding this material for students, one thing that must be considered is the selection of the right learning media [4].

From the results of the questionnaire distributed to teachers and students of class XI at SMAN 1 Padang, SMA Adabiah 2 Padang, SMAN 7 Padang, and SMAN 16 Padang, it shows that teachers from these four schools on the fundamental chemical laws topic have used media and teaching materials including books. print, LKPD, print modules, e-modules, PPT, and learning videos. The media and teaching materials are used at the stage of concept discovery and concept consolidation. However, the use of these media and teaching materials has not been able to make students independent in learning during online learning. In addition, teachers also use applications/sites in online learning such as WhatsApp, Google Classroom and Zoom meet. However, the use of these applications/sites during online learning has not been able to cause students to actively participate during learning. This of course cannot be separated from the obstacles faced by students during learning. Some of the obstacles that students experience during online learning are difficulty in having internet data, unsupported signals, not being able to go online at the specified time, difficulty accessing the application/site used and difficult to understand the subject matter. In addition, teachers also experienced problems when correcting assignments and training/evaluating students during online learning on chemistry, namely the fundamental chemical laws topic. So the need for learning media for students and teachers who can overcome the problems experienced.

Based on the results of the questionnaires given to students in the four schools, it was found that the electronic devices and applications/sites used during online learning did not attract students' interest when studying. The results of the questionnaire show that students like media/teaching materials with characteristics such as having audio and video, can be used for practice questions (concept consolidation), can be used to measure mastery of the material for students, can be used anytime and anywhere, and can be used. whether it is connected to the internet or not. So the need for learning media that matches the characteristics favored by students and is expected to be able to attract students' interest when learning.

During online learning, students and teachers in the teaching and learning process use electronic media, especially Android. From the questionnaire distributed to students, the estimated duration of android use used in a day varies, including for less than five hours, five to ten hours and more than ten hours with the percentages being 19.17%, 29.17%, respectively. and 51.67%. However, from that time, less than 25% was used for learning. This was stated by 67.50% of students who filled out the questionnaire. Then, from the questionnaire that was distributed to teachers in four schools, only one of the six teachers was aware of the existence of an Android-based mobile learning application as a learning medium and used it in the fundamental chemical laws topic. Even though the use of Android can affect students during the learning process. This is as stated by Yektyastuti and Ikhsan in their research that the existence of android-based learning media is able to affect cognitive learning outcomes in improving academic performance and also affects the form of high school students' learning motivation [5].

Android-based mobile learning application is a technology that can be used as a medium of learning in the world of education that utilizes smartphones with the android platform. This application can be developed in such a way as to meet the needs of teachers and the characteristics of students when learning.

The mobile learning application that will be developed is expected to be able to cause students to be active and independent in learning, especially during online learning, because in this application features are available in the form of material, practice

questions, discussion of questions, along with learning videos that can be accessed online. independently by students. In addition, this application should be able to overcome the obstacles that students experience during online learning such as difficulty in having internet data, unsupported signals, not being able to go online at the specified time, difficulty accessing the application/site used and difficult to understand the material being studied. because this application can be used without an internet connection so that students can access it anytime and anywhere, except in working on questions and accessing this learning video requires an internet connection.

The mobile learning application that will be developed is expected to be able to attract the interest of students while studying because this application is developed according to the characteristics of the media/teaching materials preferred by students, namely having audio and video, can be used for practice questions (concept stabilization), can be used for measuring the mastery of the material to students, can be used anytime and anywhere, and can be used in a state connected to the internet network or not. In addition, this application is expected to make it easier for teachers to correct assignments and practice/evaluate students when online learning on the fundamental chemical laws topic because after completing assignments and exercises/evaluations by students via Android, then the teacher can access students' answers via android along with the value of these students.

Android-based mobile learning applications as learning media have been carried out by previous researchers. Putri and Muhtadi [6] and Lukman and Ulfa [7] found that the use of android-based media during learning can provide an increase for students in the achievement of cognitive learning outcomes. Then Yektyastuti and Ikhsan [5] revealed that the use of developed mobile learning applications has an effect on improving students' academic performance. In addition, Harianto et al [8] found that the use of developed android-based media can foster students' scientific literacy.

Based on the above background, a variation of learning media was developed that can be used at the stage of discovering and strengthening student concepts, in the form of an Android-based mobile learning application with the title "Development of Android Based Instructional Media Applications on The Fundamental Chemical Laws Topic for Class X SMA. /MA".

## II. Research And Method

First, confirm that you have the correct template for your paper size. This template has been tailored for output on the A4 paper size. If you are using US letter-sized paper, please close this file and download the file “MSW_USltr_format”.

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This research is included in the research and development category or also known as R&D (Research and Development). R&D is a research method that has the goal of producing a product and then testing whether or not the product is effective [9]. This research was conducted to produce an Android-based mobile learning application as a learning medium on the fundamental chemical laws topic for class X SMA/MA.

Researchers determine the development model to be applied, namely the plomp development model. Plomp has three stages including preliminary research, development or prototyping phase and assessment phase [10]. Researchers limit the research to be carried out to the development or prototyping phase.

The technique of analyzing the validity of the android-based learning media application with the fundamental chemical laws topic is obtained from the processing and analysis of the questionnaire that has been filled out by the respondents. The validity analysis technique is carried out using the Aiken's V index. The Aiken's V index [11] is obtained by:

$$V = \frac{\sum s}{[n(c-1)]}$$

Description:

$V =$ validity index

$s = r - l_0$

$r$ = the score given by the assessor

$l_0$ = lowest score in the scoring category

$n$ = number of assessors (validators)

$c$ = the number of categories in the assessment

The results obtained are processed and interpreted in the Aiken's V index. The information can be seen in Table 1.

Table 1. Criteria for assessing the validity of the Aiken's V scale [12]

| No. of Items ($m$) or Raters ($n$) | Number of Rating Categories ($c$) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | |
| | V | p | V | p | V | p | V | p | V | p | V | p |
| 2 | | | | | | | 1.00 | .040 | 1.00 | .028 | 1.00 | .020 |
| 3 | | | | | | | 1.00 | .008 | 1.00 | .005 | 1.00 | .003 |
| 3 | | | 1.00 | .037 | 1.00 | .016 | .92 | .032 | .87 | .046 | .89 | .029 |
| 4 | | | | | 1.00 | .004 | .94 | .008 | .95 | .004 | .92 | .006 |
| 4 | | | 1.00 | .012 | .92 | .020 | .88 | .024 | .85 | .027 | .83 | .029 |
| 5 | | | 1.00 | .004 | .93 | .006 | .90 | .007 | .88 | .007 | .87 | .007 |
| 5 | 1.00 | .031 | .90 | .025 | .87 | .021 | .80 | .040 | .80 | .032 | .77 | .047 |
| 6 | | | .92 | .010 | .89 | .007 | .88 | .005 | .83 | .010 | .83 | .008 |
| 6 | 1.00 | .016 | .83 | .038 | .78 | .050 | .79 | .029 | .77 | .036 | .75 | .041 |
| 7 | | | .93 | .004 | .86 | .007 | .82 | .010 | .83 | .006 | .81 | .008 |
| 7 | 1.00 | .008 | .86 | .016 | .76 | .045 | .75 | .041 | .74 | .038 | .74 | .036 |
| 8 | 1.00 | .004 | .88 | .007 | .83 | .007 | .81 | .008 | .80 | .007 | .79 | .007 |
| 8 | .88 | .035 | .81 | .024 | .75 | .040 | .75 | .030 | .72 | .039 | .71 | .047 |
| 9 | 1.00 | .002 | .89 | .003 | .81 | .007 | .81 | .006 | .78 | .009 | .78 | .007 |
| 9 | .89 | .020 | .78 | .032 | .74 | .036 | .72 | .038 | .71 | .039 | .70 | .040 |
| 10 | 1.00 | .001 | .85 | .005 | .80 | .007 | .78 | .008 | .76 | .009 | .75 | .010 |
| 10 | .90 | .001 | .75 | .040 | .73 | .032 | .70 | .047 | .70 | .039 | .68 | .048 |
| 11 | .91 | .006 | .82 | .007 | .79 | .007 | .77 | .006 | .75 | .010 | .74 | .009 |
| 11 | .82 | .033 | .73 | .048 | .73 | .029 | .70 | .035 | .69 | .038 | .68 | .041 |
| 12 | .92 | .003 | .79 | .010 | .78 | .006 | .75 | .009 | .73 | .010 | .74 | .008 |
| 12 | .83 | .019 | .75 | .025 | .69 | .046 | .69 | .041 | .68 | .038 | .67 | .049 |
| 13 | .92 | .002 | .81 | .005 | .77 | .006 | .75 | .006 | .74 | .007 | .72 | .010 |
| 13 | .77 | .046 | .73 | .030 | .69 | .041 | .67 | .048 | .68 | .037 | .67 | .041 |
| 14 | .86 | .006 | .79 | .006 | .76 | .005 | .73 | .008 | .73 | .007 | .71 | .009 |
| 14 | .79 | .029 | .71 | .035 | .69 | .036 | .68 | .036 | .66 | .050 | .66 | .047 |
| 15 | .87 | .004 | .77 | .008 | .73 | .010 | .73 | .006 | .72 | .007 | .71 | .008 |
| 15 | .80 | .018 | .70 | .040 | .69 | .032 | .67 | .041 | .65 | .048 | .66 | .041 |
| 16 | .88 | .002 | .75 | .010 | .73 | .009 | .72 | .008 | .71 | .007 | .70 | .010 |
| 16 | .75 | .038 | .69 | .046 | .67 | .047 | .66 | .046 | .65 | .046 | .65 | .046 |
| 17 | .82 | .006 | .76 | .005 | .73 | .008 | .71 | .010 | .71 | .007 | .70 | .009 |
| 17 | .76 | .025 | .71 | .026 | .67 | .041 | .66 | .036 | .65 | .044 | .65 | .039 |
| 18 | .83 | .004 | .75 | .006 | .72 | .007 | .71 | .007 | .70 | .007 | .69 | .010 |
| 18 | .72 | .048 | .69 | .030 | .67 | .036 | .65 | .040 | .64 | .042 | .64 | .044 |
| 19 | .79 | .010 | .74 | .008 | .72 | .006 | .70 | .009 | .70 | .007 | .68 | .009 |
| 19 | .74 | .032 | .68 | .033 | .65 | .050 | .64 | .044 | .64 | .040 | .63 | .048 |
| 20 | .80 | .006 | .72 | .009 | .70 | .010 | .69 | .010 | .68 | .010 | .68 | .008 |
| 20 | .75 | .021 | .68 | .037 | .65 | .044 | .64 | .048 | .64 | .038 | .63 | .041 |
| 21 | .81 | .004 | .74 | .005 | .70 | .010 | .69 | .008 | .68 | .010 | .68 | .009 |
| 21 | .71 | .039 | .67 | .041 | .65 | .039 | .64 | .038 | .63 | .048 | .63 | .045 |
| 22 | .77 | .008 | .73 | .006 | .70 | .008 | .68 | .009 | .67 | .010 | .67 | .008 |
| 22 | .73 | .026 | .66 | .044 | .65 | .035 | .64 | .041 | .63 | .046 | .62 | .049 |
| 23 | .78 | .005 | .72 | .007 | .70 | .007 | .68 | .007 | .67 | .010 | .67 | .009 |
| 23 | .70 | .047 | .65 | .048 | .64 | .046 | .63 | .045 | .63 | .044 | .62 | .043 |
| 24 | .79 | .003 | .71 | .008 | .69 | .006 | .68 | .008 | .67 | .010 | .66 | .010 |
| 24 | .71 | .032 | .67 | .030 | .64 | .041 | .64 | .035 | .62 | .041 | .62 | .046 |
| 25 | .76 | .007 | .70 | .009 | .68 | .010 | .67 | .009 | .66 | .009 | .66 | .009 |
| 25 | .72 | .022 | .66 | .033 | .64 | .037 | .63 | .038 | .62 | .039 | .61 | .049 |

## III. Result And Discussion

### 3.1. Preliminary Research

The preliminary research stage includes need analysis, context analysis, literature review and conceptual framework development.

1. *Need Analysis*

Needs analysis aims to identify the perceptions of teachers and students about the conditions in the field in learning for the fundamental chemical laws topic. This process was implemented through distributing questionnaires to chemistry teachers and students at SMAN 1 Padang, SMA Adabiah 2 Padang, SMAN 7 Padang and SMAN 16 Padang.

In this stage, the results obtained: (1) Teachers have used media and teaching materials in the discovery and consolidation of concepts in online learning. However, the media and teaching materials used have not made students learn independently; (2) Teachers and 87.50% of students use android and laptops/computers in online learning. However, the media and teaching materials, electronic devices, and applications/sites used have not made students actively participate in online learning; (3) Teachers and students (percentage above 95%) like media that: have audio and video, can be used for practice questions, can be used to measure

students' mastery of the material, can be used anytime and anywhere, and can be used in internet connection or not. While students have obstacles in online learning such as difficulty in having internet data, signals that do not support, students cannot be online at the specified time, and students find it difficult to understand the material being studied. In addition, teachers have difficulty in correcting assignments and training/evaluating students in online learning on the fundamental chemical laws topic; (4) Teachers still need other alternative media in learning the fundamental chemical laws topic; and (5) On average, teachers and students have never used an android-based learning media application on the fundamental chemical laws topic so that teachers and students are interested in developing an android-based learning media application on the fundamental chemical laws topic. Whereas 19.17% of students use Android with a duration of less than 5 hours a day, 29.17% of students use Android with a duration of 5-10 hours a day and 51.67% of students use Android more than 10 hours a day. However, of the duration, 67.50% of students stated that the time used by students for learning was less than 25%. At this stage, it can be concluded that there is still a lack of variety of learning media according to the needs and characteristics of students, so an Android-based learning media application was developed for the discovery and consolidation of concepts, especially in the fundamental chemical laws topic.

2. Context Analysis

Context analysis aims to identify conditions in the field and map the scope for possible solutions. The analysis at this stage is carried out by analyzing the KI and KD for the the fundamental chemical laws topic in SMA/MA in accordance with the Minister of Education and Culture No. 37 of 2018. Based on the results of the analysis, the GPA is derived for the fundamental chemical laws topic.

At this stage, it is known that the fundamental chemical laws topic is the basic material for studying chemical calculation material and is one of the difficult materials for chemistry subjects for class X SMA/MA. Therefore, an Android-based learning media application was developed which was applied to the fundamental chemical laws topic through the stages of concept discovery and concept strengthening questions contained in the application which was adapted based on KD 3.10 and 4.10 which had been described based on the predetermined IPK.

3. Literature Review and Conceptual Framework Development

The literature review aims to find references related to research activities related to the results of the results of needs analysis and context analysis. The results obtained from the literature review are the development of android-based chemistry learning media on solubility material which has an effect on improving the academic performance of high school students referred to from Yektyastuti and Ikhsan [5]; The development of android-based chemistry learning media is useful for growing students' scientific literacy on redox and electrochemical reaction materials referred to from Harianto et al [8]; The development of android-based learning media on compound nomenclature material is able to improve students' cognitive abilities after being applied to learning referred to from Lukman and Ulfa [7]; Learning carried out with android-based interactive chemistry learning multimedia on the reaction rate material can be done anywhere and anytime and the product is proven to be effective in increasing the achievement of cognitive learning outcomes of students referred to from Putri and Muhtadi [6]; Android-based learning media developed by Pratiwi and Suputra [13] allows learning anywhere and anytime, and students can learn independently without having to be tied to face-to-face activities at school, which is useful in online learning at times like this. due to the Covid-19 pandemic.

The conceptual framework aims to produce guidelines for the framework in research based on the results of needs analysis, context analysis, and literature review. The development of a conceptual framework based on the problems and constraints experienced by teachers and students is that alternative learning media is needed, therefore an Android-based learning media application is developed. Furthermore, a conceptual framework is generated.

### 3.2. Development or Prototyping Phase

The development or prototyping phase has the goal of making relevant devices (products) based on the results of the identification at the preliminary research stage, then revised based on formative evaluations and continued with validating the products that have been made. This stage produces only up to prototype III before creating the final prototype. The results of each prototype at this stage are described as follows.

1. Prototype I

The resulting prototype I is an Android-based learning media application on the fundamental chemical laws topic which consists

of several components, namely; application main display, application homepage, Core Competencies (KI), Basic Competencies (KD), Competency Achievement Indicators (IPK), learning objectives, application usage instructions, attendance lists, material descriptions, evaluation and discussion questions, feedback, developer profiles and reference.

- Application Main View

The main display of the application is designed to contain the agency logo, application logo, containing the words " Jangan lupa berdoa sebelum memulai pembelajaran!" and a button to open the app homepage. The main view of the application can be seen in Figure 1.


Figure 1. Application Main View

- Application Home

The application homepage consists of several buttons that can open the screen contained in the application component selection. These buttons include a button to the screen; competencies, instructions, attendance lists, materials, evaluations, feedback, developer profiles and references. The application homepage can be seen in Figure 2.


Figure 2. Example of App Home view

- Core Competencies (KI), Basic Competencies (KD), Competency Achievement Indicators (IPK) and Learning Objectives

The presentation of Core Competencies (KI), Basic Competencies (KD), Competency Achievement Indicators (IPK) and Learning Objectives aims to make teachers and students know the minimum competencies to be achieved in the learning process. The display for this section can be seen in Figure 3.


(a) (b) (c) (d)

Figure 3. Display (a) Core Competencies, (b) Basic Competencies, (c) Competency Achievement Indicators, (d) Learning Objectives

- Application Instructions

Instructions for using the application consist of instructions for using the application for teachers and students. These instructions are useful to make it easier to use the application in the learning process. The display of application usage instructions can be seen in Figure 4.


(a) (b)

Figure 4. Display (a) Instructions for Use of Applications for Teachers and (b) Instructions on Using Applications for Students

- List of attendees

The attendance list is intended so that students can fill out the attendance list through an online application. The attendance list in this application is connected to the Google Form, so that the attendance of students can be accessed by the teacher on the Google Form spreadsheet page. The display of the attendance list can be seen in Figure 5.


Figure 5. Attendance List View

- Material Description

The learning material contains prerequisite material, motivation, and material description. The description of the material is arranged based on one of the learning models (guided inquiry). The material contains learning pictures and videos as well as questions that guide students in finding and understanding concepts during learning. The material is also equipped with a discussion of examples of questions about the material being studied as a concept stabilization for students. The display of the attendance list can be seen in Figure 6.

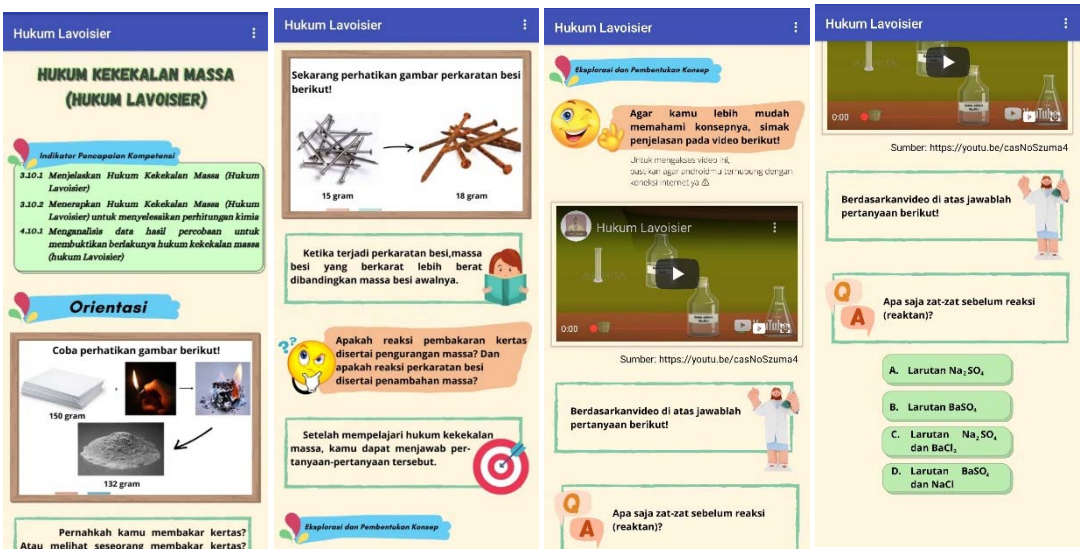


Figure 6. Material Description Display

- Evaluation

The evaluation contains questions and discussions related to the learning material. Evaluation questions are made based on the existing question grids. The evaluation questions are then inputted into Quizizz and collaborated with the application, so that the

questions can be accessed directly through the application. The evaluation is filled in after students complete all the learning materials in the application. The discussion of application questions is then inputted into the Google Form and collaborated with the application, so that the discussion of evaluation questions can be directly accessed through the application. Discussion of questions on the application can be accessed after all students work on evaluation questions then the teacher will give a password so that students can access the discussion of evaluation questions. The evaluation display can be seen in Figure 7.


Figure 7. Evaluation Display

- Feedback

Feedback is useful so that teachers can find out reviews and suggestions from students on the learning process by using the application. Display Feedback can be seen in Figure 8.


Figure 8. Feedback Display

- Developer Profile

The developer profile contains the identity of the developer, the name of the supervisor as well as the names of the app validators. The developer profile view can be seen in Figure 9.


Figure 9. Developer Profile Display

- Reference

Reference or bibliography is a list of sources or author references in developing the contents of the application. The reference display can be seen in Figure 10.


Figure 10. Reference Display

The design of the app was designed using the Canva website. Then the manufacture of prototype I in the form of an Android-based learning media application on the fundamental chemical laws topic was generated using the Kodular website.

2. Prototype II

After obtaining prototype II, then self-evaluation was carried out to produce prototype II. Self-evaluation focuses on discrepancies in typing letters, key sizes and completeness of components in the application. In general, many improvements were made to the use of sentences, writing errors and the size of the buttons in the application. After self-evaluation and revision, prototype II was obtained.

3. Prototype III

Prototype III was produced after an expert review and one-to-one evaluation of prototype II were carried out. The prototype II that has been produced is then carried out by an expert review by experts (lecturers and chemistry teachers) and a one-to-one

evaluation is carried out with three students of class X high school. After revision, prototype III was produced.

- Expert Review

The resulting prototype II was validated by four material experts and three media expert validators. Material expert validation was carried out by experts in the field of chemistry consisting of three Chemistry teachers at SMAN 7 Padang and one Chemistry lecturer at the Faculty of Mathematics and Natural Sciences, UNP. The media expert validation was carried out by experts consisting of three lecturers of Electronic Engineering FT UNP.

Components assessed by material expert validators are assessed based on content validity where the content of this application is based on scientific knowledge and all components must be consistently connected to each other (construct validity). Assessment of the validity of content and constructs is contained in a validation questionnaire which is divided into content components, construct components, linguistic components and graphic components. Each component has a question item filled out by the validator. The results of the assessment by the validator on the designed product were then analyzed using Aiken's V. The results of the validity data analysis of the android-based learning media application by the material expert validator for all aspects assessed were briefly presented in Table 2.

Table 2. Results of Material Expert Validity Data Analysis for All Aspects Assessed

| Numb. | Rated Aspect | Aiken's V Value | Category Validity |
|---|---|---|---|
| 1 | Content Component | 0,996 | Valid |
| 2 | Construct Component | 0,998 | Valid |
| 3 | Language Component | 1,00 | Valid |
| 4 | Graphic Components | 1,00 | Valid |
| Average | | 0,998 | Valid |

Based on the results of the material validation analysis in Table 2, the overall average value of Aiken's V is 0.998. This shows that the application developed with content and construct validity has a valid category.

On the other hand, the components assessed by the media expert validator were Media efficiency, key functionality, and physical quality of the application. Each component also has a question item filled out by the validator. The results of the assessment by the validator on the designed product were then analyzed using Aiken's V. The results of the validity data analysis of the android-based learning media application by the media expert validator for all aspects assessed were briefly presented in Table 3.

Table 3. Media Expert Validity Data Analysis Results for All Aspects Assessed

| Numb. | Rated Aspect | Aiken's V Value | Category Validity |
|---|---|---|---|
| 1 | Efisiensi Media | 1,00 | Valid |
| 2 | Fungsi Tombol | 1,00 | Valid |
| 3 | Kualitas Fisik | 1,00 | Valid |
| Average | | 1,00 | Valid |

Based on the results of the media expert validation analysis in Table 3, the overall average value of Aiken's V is 1.00. This shows that the application developed according to media experts has a valid category.

- One-to-One Evaluation

Based on the results of filling out a questionnaire via google forms by three students at SMAN 7 Padang, the results of a one-

to-one evaluation were obtained, namely, in terms of the appearance of the homepage, images and videos on the application can provide an attraction for students to learn the application. The use of letters, punctuation marks, type (font) and size (size) used in the application produced in prototype II is clear and the language used is easily understood by students. In addition, students are also easy to understand the instructions for using the application. Prototype II in the form of an Android-based learning media application on the fundamental chemical laws topic is considered to have easy-to-understand learning stages. Then the material presented in prototype II is easy to understand and can also provide an attraction for students in learning the application. The pictures and videos contained in prototype II can be clearly observed by students and can help students find and understand concepts.

## IV. CONCLUSION

An android-based learning media application has been produced on the fundamental chemical laws topic for class X SMA/MA using the Plomp model. The android-based learning media application on the fundamental chemical laws topic class X SMA/MA which was developed has an Aiken's V index of 0.998 with a valid category based on the material expert validator and 1.00 with a valid category based on the media expert validator.

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