CHAPTER IV
RESEARCH RESULT AND DISCUSSION

4.1. Research Result

The results of this development research is Student Worksheet based android which contains materials and exercises about the problem of Acid-Base taught in Senior High School class XI students even semester in accordance with the curriculum 2013. Student Worksheet based android developed in the form of application with format file.apk (Android Package) with size 1.8 MB (Megabyte), named "Quiz Asam Basa". The application of this Student Worksheet can be operated on mobile phones that have android operating system at least version 4.1 - 4.3 (Jelly Bean) and above version (Kitkat, Lollipop, Marshmallow, Nougat, and Oreo) with best display on screen size 4.5 "- 5 ".

The development of learning media in the form of Student Worksheet based on Android follow the development model of ADDIE with the stages of Analysis, Design, Development, Implementation, and Evaluation, but in this study only until the implementation stage only.

The data obtained in this research development consists of three types, namely product development data, product quality assessment data, and data increase motivation and student self-learning. Product development data are suggestions from media experts, material experts, and three high school chemistry teachers. The product quality assessment data are questionnaire consisting of five choices of answers: Very Good (VG), Good (G), Enough (E), Less (L), Very Less (VL) and given to two chemistry lectures as media experts and material experts, and to three high school chemistry teachers. While the data for increasing of motivation and student self-learning is measured by questionnaire consisting of five choices of answers are Very Agree (VA), Agree (A), Doubtful (D), Disagree (DA), Very Disagree (VDA) which was given to 31 students of Class XI IPA in SMA N 1 Perbaungan.

4.2.   Data Analysis and Discussion

This development research has three types of data, ie product development data, product quality assessment data by media experts, material experts, three high school chemistry teachers and data of increasing motivation and students self-learning by Class XI students. The following is an explanation of the data obtained from the research on the development of the Student Worksheet based android on Acid-Base material.

4.2.1. Product Development Data

Development of Student Worksheets Based Android follows the ADDIE development model with stages of Analysis, Design, Development, Implementation and Evaluation, but in this study only until the implementation stage. Implementation of the entire procedure for developing this research in detail can be seen in the description as follows:

4.2.1.1.Analysis Stage

A. Requirement Analysis

1.   Requirement and characteristics of students

This research started from observation to school that is SMA Negeri 1 Perbaungan. Based on observations that have been done, most students experience saturation in learning because there are still many teachers who use conventional teaching methods of lectures and less use of learning media. These things resulted in the students less understanding of the material being taught, no attention to teacher explanations, and students only focus on gadget respectively. Along with technological developments, students have a tendency to connect with mobile communication devices or smartphones. The researchers observed that the use of smartphones can take students' time, for example, to play music, play games, and access various social media. Students who feel bored when doing learning will be more interested in doing other things like chatting with friends or doing other activities with smartphone. The tendency to reduce student learning interest due to more interesting

smartphone than books can be anticipated by making learning media that utilize smartphones. Smartphones are used using the Android operating system. The Android operating system is selected because this system is the most widely used system than any other operating system.

The use of learning media that utilizes this smartphone is very easy and can be used independently by students. Learning media can be used anytime and anywhere because of its portable nature. The process of spreading is quite easy because the size is not more than 1.8 MegaByte. The distribution process is downloaded directly from the Play Store to be installed and can be used offline.

2. Software and hardware

The creation of an Android-based Student Worksheet requires appropriate hardware and software. Software used for the creation of this Student Worksheet has the following specifications

    a. Android Studio

    b. JDK (Java Development Kit)

    c. Android SDK (Software Development Kit)

Based on the above data, then the hardware needed to create learning media in the form of Android Student Worksheet this is:

    a. Intel Core i5

    b. 16 GB RAM

    c. Hard Disk 500 GB

B. Competency and Instructional Analysis

Competency and instructional analysis is related to the Competency Standards and Basic Competencies that will be published in the Student Worksheet. Acid-base material according to Competency Standard (SK) and Basic Competence (KD) can be seen in **Appendix 4**.

4.2.1.2.Design Stage

The design stage is the design phase of the Student Worksheet which includes the design of the Student Worksheet as a whole (storyboarding), the preparation of material, questions and answers, making the background, images, and buttons to be included in the application.

a. **Making of Student Worksheet (storyboard)**

Storyboard describes the overall description of the application to be loaded. Storyboard serves as a guide like map to ease the creation process.

b. **Setting material**

At this stage a basic material selection base on Acid-Bases is proposed. This material was chosen because of difficulties in terms of understanding the material quite a lot. In addition, there is a lack of use of learning media and many teachers who use conventional methods or lectures in teaching chemistry.

c. **Preparation of questions and answers**

The questions and answers that will be contained in this student's Worksheet are the material about the Bases as a whole. The preparation of materials, questions, and answers in this Student Worksheet is made from various references. The material, questions, and answers contained in this Student Worksheet are shown in **Appendix 5**.

d. **Collection of backgrounds, fonts, images, and buttons**

The images presented in this Student Worksheet are downloaded images from various sources. The creation and combining of images is done using the *PhotoShop CS 4* program. Most images are made in *portable network graphics (.png)* format because images with .png format can be made with a transparent background so that it will make it more attractive and beautify the look of the Student Worksheet.

4.2.1.3.Development Stage

   a. **Making Student Worksheet Products Based on Android**

        The Student Worksheet Based Android is built using hardware with 500 GB hard disk specifications, 16 GB RAM, and Windows operating system 10. This Student Worksheet is called "Quiz Asam Basa". All components that have been prepared at the design stage then assembled into a single unit using Android Studio software. Components are assembled into a single media unit according to the storyboard that has been made before. The first step is to make the initial appearance of the application icon "Quiz Asam Basa" as shown

**Figure 4.1**. Application icon of "Quiz Asam Basa"

After the icon is clicked the main application menu will appear
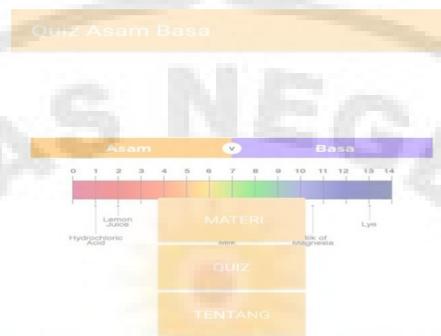
Figure 4.2. The main menu of the application

In the main menu of "Quiz Asam Basa" application there are three menus, and each has a different function. The three menus are **Materi, Quiz, Tentang**.

The first menu is the **Materi**. In this section, if selected, the page will contain a material consisting of the Konsep Asam Basa, Indikator Asam Basa, Sifat Asam Basa, Derajat Keasaman (pH), dan Kesimpulan.
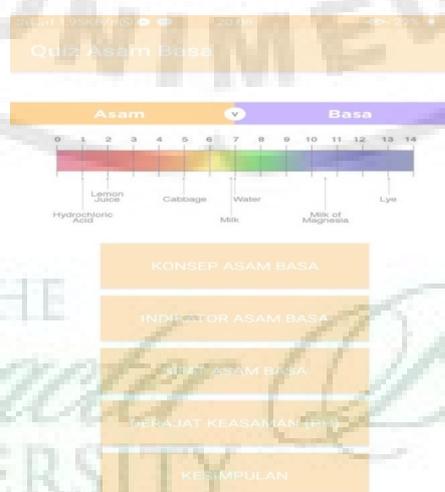

Figure 4.3. The display of Materi menu

Figure 4.4. The display of Sub Material for Acid Base Concepts and Acid Base Indicator

Subpage material will appear after touching one of the buttons in the previous menu. The main material contains the material according to the sub-material that has been determined. Sub-material display can be zoomed in for more detail. This display applies to all sub-materials ranging from Konsep Asam

Basa, Indikator Asam Basa, Sifat Asam Basa, Derajat Keasaman (pH), dan Kesimpulan.

The second menu is **Quiz**. In this section, if you choose it will load 20 items randomly. Each question that appears will be given 60 seconds for each process.
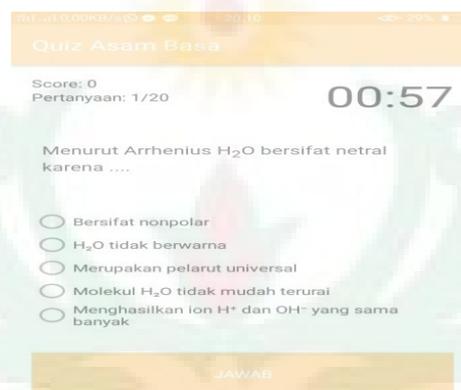
**Figure 4.5**. The display of questions on the Quiz menu

Application users can immediately see the results of their work after completing the 20 questions. By touching the "selesai" button at the bottom of question number 20, which can be seen in the picture
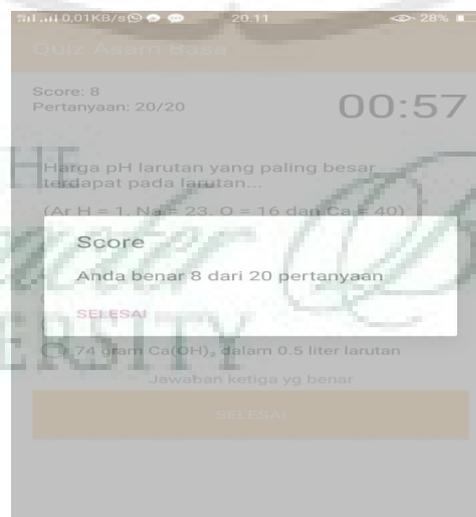
Figure 4.6. The display score of answers

Based on the above display, we can know the number of correct questions. The wrong number cannot be used by the user to correct an error in the number, because the order of the problem every time it opens will change. Reciprocity after doing the problem is made like that in the hope that users do not memorize the answer questions, but understand the problem and analyze each answer question to determine the correct answer.

The third menu is **Tentang**. The menu is created so that the user knows the history of the application. Here's the screen display in the menu **Tentang** what can be seen in the picture
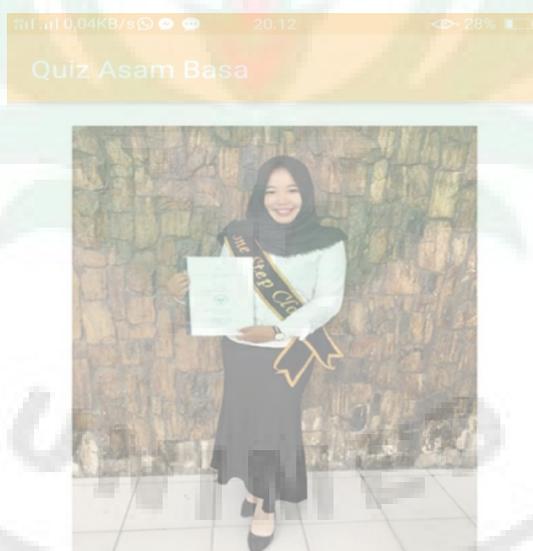
Nama saya HILMA HUMAIRA, seorang mahasiswa Program Studi Pendidikan Kimia Bilingual angkatan 2014 di Universitas Negeri Medan (UNIMED). Saya lahir di Desa Pematang Guntung, Kec. Teluk Mengkudu, Kab. Serdang Bedagai pada tanggal 1 Februari 1996. Riwayat pendidikan saya yaitu menempuh Pendidikan Sekolah Dasar di SD 107441 Pematang Guntung (2002), Sekolah Menengah Pertama (SMP) di SMP N 2 Teluk Mengkudu

Figure 4.7. The display of Tentang menu

b. **Validation of material experts, media experts, and chemistry teachers**

The initial media then goes through the validation stage. At this stage the media is validated by material experts and media experts ie chemistry lecturer at Medan State University and three chemistry teachers at SMA N 1 Perbaungan. Suggestions from material experts, media experts, and chemistry teachers will

serve as a basis for media revision to make better developed media. Based on suggestions or opinions from material experts, media experts, and chemistry teachers, revisions were made to make the learning media better.

1. **Revision by media expert**

   a. The picture and molecular structure do not cover the writing, the revision is done by tidying up the image and molecular structure that existed on the Student Worksheet.

   b. The picture is given a number and description, the revision is done by giving the number and description on each picture that is on the Student Worksheet.

   c. Tidying up the writing, the revision was done by tidying up the writing on the sub material so that the user feels more comfortable when reading.

Figure 4.8. The display of sub material before revision

2. **Revision by material experts**

a. The answer key was added with a short reason, no revisions were made because the questions in the Student Worksheet were only made in multiple choice and there was only one correct answer, not containing an explanation.

4.2.1.4.Implementation Stage

The implementation stage is carried out by distributing applications for Student Worksheets based Android to 31 class XI IPA Unggulan students of SMA N 1 Perbaungan. Before use, students are required to install the application on a smartphone device. App deployment is done through the Play Store. At the end of the study the students are asked to respond or opinion by filling out a questionnaire that has been given. Questionnaires given to students to find out whether the Student Worksheets based Android can improve their learning motivation and self-learning.

4.2.2. Product Quality Assessment Data

4.2.2.1.Quality of Student Worksheet Based Android Overall

The product quality assessment data is obtained based on the validator assessment by using the assessment questionnaire previously consulted with the supervisor. Questionnaire is a list of 7 aspects of criteria with 27 indicators to be assessed by validators. The seven aspects are the truth of concept, breadth and depth of concept, material device aspect and question, language structure, Student Worksheet display, software engineering, and implementation. The result of product quality assessment is qualitative value which then converted into quantitative value by using Likert scale. The data is then analyzed, so that the average score of each aspect is determined and converted to qualitative criteria according to each aspect assessment category. Analysis result of quality assessment of Student Worksheet based android on acid-base material from validator can be seen in **Appendix 6** (**Table 4.1**).

The results of the product quality assessment analysis obtained an overall average score of 4.377. Based on the ideal criterion, the average score of 4.377 is included in the range $\bar{X} > 4.188$ with the Very Good (VG) quality category. The percentage value of product ideality as a whole is 87.5%.

4.2.2.2.Quality of Student Worksheet based Android on Each Aspect

Based on the results of the quality assessment of the Student Worksheets based android on the Acid-Base material of the validators presented in **Table 4.1**, it can be illustrated in the percentage ideal graph of each aspect of criteria such as **Figure 4.9**.
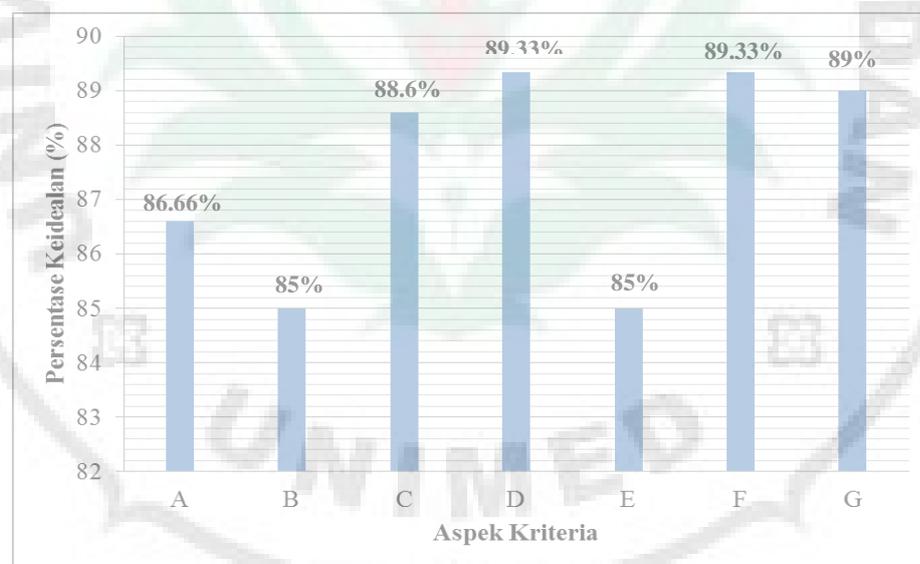
Figure 4.9. Graph of Percentage Ideal Each Aspect of Criteria by Validator

Information:

A = aspect of truth of concept
B = aspect breadth and depth of concept
C = material device aspect and question
D = aspects of language structure
E = student worksheet display aspect
F = software engineering aspects
G = aspect of implementation

In addition to determine the percentage of idealization, also determined the quality category of each aspect of the assessment criteria Student Worksheet developed based on the score of each aspect of the criteria to determine the

specific quality of the product. The description of the quality category for each aspect of Student Worksheet based android on Acid-Base material is as follows:

4.2.2.2.1. Aspects of Truth Concepts

The concept of truth aspect has three indicators that must be assessed by the validator. These three indicators can be seen in **Table 4.2**.

Table 4.2. Explanation of the conceptual truth aspect

No.	Indicator
1	Kesesuaian materi dengan Kurikulum 2013
2	Tidak ada aspek yang menyimpang
3	Kelogisan dan sistematika penyajian materi

The result of the validator assessment on the aspect of the concept truth obtained the scores of 4.6, 4.2 and 4.2 respectively for each of the above indicators, so that the average score of this aspect is 4.3 from the maximum score of 5. Based on the ideal scoring criteria, the average score include in the range $\overline{X} > 4.188$, so that the aspect of concept truth is included in the category of Very Good (VG). The percentage value of product ideality in the aspect of concept truth is 86.66%.

Based on the category of quality aspects of the truth of the concept as a whole, it can be concluded that the material presented in this product does not cause concept errors, which can affect the thinking patterns of learners about the material presented.

4.2.2.2.2. Aspects of Breadth and Depth Concepts

The breadth and depth aspect of the concept has four indicators that must be assessed by the validator. The four indicators can be seen in **Table 4.3**.

Table 4.3. Descriptions of the breadth aspect and depth indicators

No.	Indicators
1	Pengembangan konsep
2	Keseimbangan proporsi materi yang esensial
3	Penggunaan informasi yang baru
4	Kuis dan latihan soal disajikan sebagai alat evaluasi untuk meningkatkan pemahaman peserta didik

The results of the validator assessment on the aspect of breadth and depth of concept obtained scores respectively 4.4, 4.2, 4.2, and 4.2, so the average score of this aspect of 4.25 of the maximum score of 5. Based on the ideal scoring criteria, on the average score entered in the range $\overline{X} > 4.188$, so that the breadth and depth aspects of the concept are included in the category of Very Good (VG). The percentage value of product ideality in the aspect breadth and depth of the overall concept is 85%.

Based on the broad aspect quality category and the depth of the concept as a whole, it can be concluded that the material presented in this product has the breadth and depth of the concept is good. The breadth and depth of the concept (material) presented can be used to add learners' insight into Acid and Base material.

4.2.2.2.3. Aspects of Material and Question Devices

The material and question devices aspect has six indicators to be assessed by the validator. The six indicators can be seen in **Table 4.4**.

Table 4.4. Descriptions of material and question aspects of the device

No.	Indicators
1	Kesesuaian materi dalam media pembelajaran dengan Kompetensi Dasar (KD)
2	Kesesuaian soal dalam media pembelajaran dengan Kompetensi Dasar (KD)
3	Keberagaman tingkat kesukaran soal
4	Ketepatan pemberian umpan balik atas jawaban penggunaan
5	Kesesuaian penjabaran materi dalam LKS dengan tujuan pembelajaran
6	Kuis dan latihan soal tidak mengarah ke jawaban benar

The results of validator assessment on the material and matter aspects obtained scores 4.8, 4.4, 4.6, 4.2, 4.2, and 4.4 respectively, so that the average score of this aspect is 4.43 from a maximum score of 5. Based on the ideal scoring criteria, the average score is within the range of $\overline{X} > 4.188$, so that the material and matter aspects are included in the Very Good (VG) category. The percentage value of product ideality in material device aspect and matter is 88.6%.

Based on the material aspect quality category and overall problem, it can be concluded that this product can be used by learners to measure their ability independently.

4.2.2.2.4. Aspects of Language Structure

The language structure aspect has three indicators that must be assessed by the validator. These three indicators can be seen in **Table 4.5**.

Table 4.5. Description of indicators of aspects of language structure

No.	Indicators
1	Penggunaan bahasa yang komunikatif
2	Ketepatan penggunaan istilah
3	Kemudahan materi untuk dipahami

The result of validator assessment on the aspects of language structure obtained scores are 4.4, 4.4, and 4.6 respectively, so the average score of this aspect is 4.46 from the maximum score of 5. Based on the ideal scoring criteria, the average score is included in the range $\bar{X} > 4.188$, so that the language structure aspects are included in the category of Very Good (VG). The percentage value of product idealization in the aspect of language structure is 89.33%.

Based on the category of quality aspects of the language as a whole, it can be concluded that the language used communicative, the use of appropriate terms, and not difficult in understanding the material.

4.2.2.2.5.   Aspects of the Student Worksheet Display

Aspects of the Student Worksheet display has four indicators that must be assessed by the validator. The four indicators can be seen in **Table 4.6**.

Table 4.6. Description of indicators of aspects Student Worksheet display

No.	Indicators
1	Kesesuaian ukuran teks dengan gambar
2	Kesesuaian ilustrasi gambar dengan materi
3	Kesesuaian pemilihan background (latar belakang)
4	Kesesuaian pemilihan warna tampilan

The result of validator assessment on Student Worksheet display aspect obtained score 4.2, 4, 4.4, and 4.4 respectively, so that the average score of this aspect is 4.25 from the maximum score of 5. Based on the ideal scoring criteria, the average score is included in the range $\overline{X} > 4.188$, so the display aspect of Student Worksheet is included in the category of Very Good (VG). The percentage value of product idealization in Student Worksheet display aspect is 85%.

In general, the Student Worksheet display quality aspect category is included in the category of excellent quality. It shows that the Student Worksheet display has a color composition that is presented accordingly, so as not to disturb the users, especially high school students while reading.

4.2.2.2.6. Aspects of Software Engineering

Software engineering aspects have three indicators that must be assessed by the validator. These three indicators can be seen in **Table 4.7**.

Table 4.7. Description of indicators of software engineering aspects

No.	Indicators
1	Kemudahan mengoperasikan LKS
2	Kemampuan penggunaan LKS secara berulang-ulang
3	Peluang pengembangan LKS terhadap perkembangan IPTEK

Validator assessment results on software engineering aspects obtained scores respectively 4.4, 4.4, and 4.6, so the average score of this aspect of 4.46 of the maximum score of 5. Based on the ideal scoring criteria, the average score is included in the range $\overline{X} > 4.188$, so the software engineering aspect is included in the Very Good (VG) category. The percentage value of product ideality in the software engineering aspect is 89.33%.

Quizzes in the product are made with a random arrangement for each user when opening the quiz menu. In addition, feedback after completing the quiz will appear a dialog box containing the number of true questions and the wrong sequence number of the problem. It is intended that the problems contained in the product can be used repeatedly. Arrangement of randomly generated questions is expected to minimize the user to memorize the answer questions, so users will read the questions and answers before answering.

Overall, it can be concluded that the product made in terms of software engineering has been very good. It shows that validators appreciate the creativity and innovation of developed chemistry learning media, thus providing opportunities for further media development in accordance with the development of science and technology.

4.2.2.2.7. Aspects of Implementation

The implementation aspect has four indicators that the validator should assess. The four indicators can be seen in **Table 4.8**.

Table 4.8. Description of indicators of the implementation aspects

No.	Indicators
1	Penggunaan pendekatan keterampilan proses
2	Kesesuaian dengan jenis kegiatan yang digunakan
3	Penyajian materi secara menarik
4	Dapat digunakan sebagai LKS mandiri untuk peserta didik

The results of the validator assessment on the aspect of implementation obtained scores of 4.2, 4.4, 4.6, and 4.6 respectively, so the average score of this aspect of 4.45 from a maximum score of 5. Based on the ideal scoring criteria, the average score is included in range $\overline{X} > 4.188$, so that the implementation aspect is included in the category of Very Good (VG). The percentage value of product ideality in the aspect of implementation is 89%.

The product that has been created contains the material that is accompanied by a supporting image. The materials and supporting images presented in the worksheet can be used as an independent learning media for learners when they are not in school.

The results of the product assessment on the aspect of the implementation obtained an excellent idealized percentage value. Acid-Base material is mostly presented in book, website, slide or handout. Presentation of the material in the form of android applications that have not been developed so much of the material presented more interesting than in other forms. This developed android application is made in offline form, so users, especially high school class XI students can run the application anywhere and anytime without any time limit, even if it does not have internet connection.

### 4.2.3. Data of Increasing Motivation and Student Self-Learning
4.2.3.1. Increasing Motivation and Student Self-Learning of the Student Worksheet Based Android Overall

The data of increasing motivation and self-learning of students were obtained based on the assessment of 31 class XI students by using an assessment questionnaire that had previously been consulted to the supervisor. The assessment questionnaire is a questionnaire containing 7 aspects of the criteria with the number of 15 indicators that must be assessed by students. These seven aspects include the truth of the concept, the breadth and depth of concepts, device of material and questions, language structure, display of Student Worksheets, software engineering, and implementation. Data from the increase of students' motivation and self-learning are qualitative values which are then converted to quantitative values using a Likert scale. The data is then analyzed, so that the average score of each aspect is determined and converted to qualitative criteria according to each aspect assessment category. The results of an analysis of increasing student motivation on Student Worksheets based android on Acid-Base material from students can be seen in **Appendix 7** (**Table 4.10**).

The result of the increasing of motivation and student self-learning obtained the overall average score of 4.41. Based on the ideal criteria, the average score of 4.41 is included in the range $\overline{X} > 4.188$ with the Very Agree (VA) category. The overall percentage value of the product as a whole is 87.48%.

4.2.3.2. Motivation and Student Self-Learning of the Student Worksheet Based Android on Each Aspects

Based on the result of the increasing of students' motivation and self-learning of the Student Worksheet based android on the acid-base material of the students presented in **Table 4.10**, it can be illustrated in the percentage graph of idealization of each aspect of criteria like **Figure 4.10**.
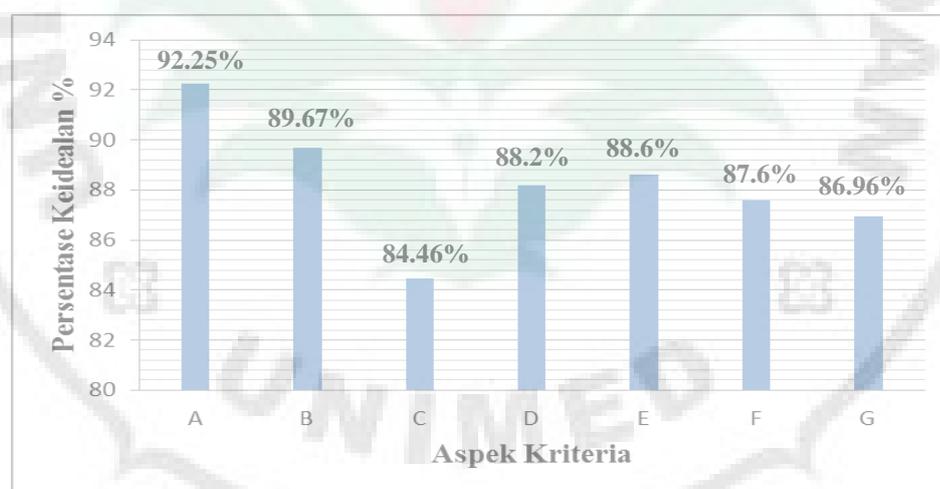
Figure 4.10. Graph of Percentage Ideal Each Aspect of Criteria Based on Student Assessment

Information:

A = aspect of truth of concept
B = aspect breadth and depth of concept
C = material device aspect and question
D = aspects of language structure
E = student worksheet display aspect
F = software engineering aspects
G = aspect of implementation

In addition to determining the percentage value of ideality, also determined categories of motivation and self-learning of students increase on each aspect of the assessment criteria Student Worksheet developed to determine the increase in motivation and self-learning of students in specific. Description of categories of motivation increasing and student self-learning for each aspect criteria of the Student Worksheet based android on Acid-Base material as follows:

4.2.3.2.1. Aspects of Truth Concepts

The truth aspect of the concept has 1 indicator that must be assessed by students. These indicators can be seen in **Table 4.11**.

Table 4.11. The description of the conceptual truth aspect

No.	Indicator
1	Materi yang disajikan pada LKS ini sesuai dengan kurikulum 2013

The result of the students' appraisal on the aspect of the truth concept obtained an average score of 4.35 for Printed Student Worksheet and 4.61 for Student Worksheet Based Android from maximum score of 5. Based on the ideal scoring criteria, the average score of Printed Student Worksheet and Student Worksheet Based Android goes in the range $\overline{X} > 4.188$, so the truth aspect of the concept belongs to the category of Very Agree (VA). The percentage value of product ideality in the aspect of the truth concept for Printed Student Worksheet is 87% and Student Worksheet Based Android is 92.25%.

Based on the category of improvement of students' motivation and self-learning on the aspect of the truth of the concept as a whole, it can be concluded that students very agree the material presented in Printed Student Worksheet or Student Worksheet Based Android is made in accordance with the current curriculum that is Curriculum 2013.

4.2.3.2.2. Aspects of Breadth and Depth Concepts

The aspect of breadth and depth of concept has one indicator that must be assessed by students. These indicators can be seen in **Table 4.12**.

Table 4.12. The descriptions of the breadth aspect and depth indicators

No.	Indicator
1	Materi yang disajikan pada LKS ini sesuai dengan konsep yang berkembang

The results of the students' assessment on the aspect of breadth and depth of the concept obtained an average score of 3.87 for Printed Student Worksheet and 4.48 for Student Worksheet Based Android from maximum score of 5. Based on the ideal scoring criteria, the average score of Printed Student Worksheet entered in the range $3.396 < \bar{X} \leq 4.188$ and Student Worksheet Based Android entry in the range $\bar{X} > 4.188$, so that the breadth and depth aspects of the concept on Printed Student Worksheet included in the category Agreed (A) and Student Worksheet Based Android included in the category Very Agree (VA). The percentage value of product idealization in aspect breadth and depth of concept for Printed Student Worksheet is 77.4% and Student Worksheet Based Android is 89.67%.

Based on the category of motivation improvement and student self-learning on the aspect of breadth and depth of the concept as a whole, it can be concluded that the material presented in Printed Student Worksheet or Student Worksheet Based Android has the breadth and depth of the concept is good. The breadth and depth of a good (material) concept on Student Worksheet can add interest, motivation, and insight to learn about acid and base materials.

4.2.3.2.3. Aspects of Material and Question Devices

The material and question aspect has three indicators that must be assessed by the students. These three indicators can be seen in **Table 4.13**.

Table 4.13. The description of the indicator of material and question aspects

No.	Indicators
1	Kuis atau latihan soal dapat membantu saya memahami materi pembelajaran
2	Soal yang disajikan memiliki tingkat kesukaran yang berbeda
3	Saya bisa mengukur sejauh mana kemampuan saya dengan adanya hasil berupa nilai dari setiap kuis yang saya ikuti

The result of the students' appraisal on the material and question aspect obtained the average score of this aspect of 3.26 for Printed Student Worksheet and 4.22 for Student Worksheet Based Android from maximum score of 5. Based on the ideal scoring criteria, the average score on the Printed Student Worksheet falls within the range of $2.604 < \bar{X} \leq 3.396$ and Student Worksheet Based Android fall within the range $\bar{X} < 4.188$, so the students' judgment on the material device aspects and problems for Printed Student Worksheet belongs to the Doubtful (D) category and for Student Worksheet Based Android is included in the Very Agree (VA) category. The percentage value of product ideality in the material device aspect and the problem for Printed Student Worksheet is 65.33% and Student Worksheet Based Android is 84.46%.

Based on the category of students' motivation and self-learning improvement for the material tool aspect and the problem as a whole, it can be concluded that the students are still in doubt that the material and problems in Printed Student Worksheet can be used to measure their ability. While on Student Worksheet Based Android, students agree that the material and problems in the Student Worksheet can be used by learners to measure their ability independently.

4.2.3.2.4. Aspects of Language Structure

Language structure aspects have one indicator that must be assessed by students. These indicators can be seen in **Table 4.14**.

Table 4.14. The description of indicators of language structure aspects

No.	Indicator
1	Saya dapat memahami materi ini dengan mudah karena materi yang disajikan jelas

Student assessment results on language structure aspects obtained an average score of 3.54 for Printed Student Worksheet and 4.41 for Student Worksheet Based Android from a maximum score of 5. Based on the ideal assessment criteria, the average score of Printed Student Worksheet was in the range of $3.396 < \bar{X} \leq 4.188$ and Student Worksheet Based Android entered in the range $\bar{X} > 4.188$, so that the aspect of language structure in Printed Student Worksheet included in the category Agree (A) and Student Worksheet Based Android included in the category of Very Agree (VA). The percentage value of product ideality in the language structure aspect for Printed Student Worksheet is 70.8% and Student Worksheet Based Android is 88.2%.

Based on the category of increasing motivation and self-learning of students for aspects of language structure as a whole, it can be concluded that the language used in Printed Student Worksheet and Student Worksheet Based Android is communicative language with the use of appropriate terms. This can be seen from the students' assessment that the language in the material presented does not make it difficult for students to understand it so that students are interested in reading the material in the Student Worksheet.

4.2.3.2.5. Aspects of Student Worksheet Display

Display of Student Worksheet aspect has three indicators that must be assessed by students. These three indicators can be seen in **Table 4.15**.

Table 4.15. The description of Student Worksheet display aspect indicators

No.	Indicators
1	Saya dapat membaca teks dengan mudah karena jenis dan ukuran huruf yang digunakan sesuai
2	Saya suka dengan tampilan LKS ini karena memiliki komposisi warna yang serasi
3	Saya dapat memahami materi dengan bantuan gambar yang memiliki kualitas yang baik

The results of the students' appraisal on the Student Worksheet display aspect obtained an average score of 3.6 for Printed Student Worksheet and 4.43 for Student Worksheet Based Android from maximum score of 5. Based on the ideal scoring criteria, the average score of Printed Student Worksheet entered in the range $3.396 < \bar{X} \leq 4.188$ and Student Worksheet Based Android is included in the range $\bar{X} > 4.188$, so the display aspects of Student Worksheet on Printed Student Worksheet are included in the Agree (A) category and Student Worksheet Based Android are included in the Very Agree (VA) category. The ideality percentage of the product in the display aspect of Printed Student Worksheet is 73.73% and Student Worksheet Based Android is 88.6%.

In general, the display category of Student Worksheet on Printed Student Worksheet or Student Worksheet Based Android is included in the category of excellent quality and can motivate students to learn. It can be seen from the results of student assessment that the Student Worksheet display has the composition of color and corresponding letter size, images that have good quality, and do not disturb the user especially high school students while reading. So that learners are interested to continue to open and read the Student Worksheet.

4.2.3.2.6. Aspects of Software Engineering

Software engineering aspects have one indicator that must be assessed by the students. This indicator can be seen in **Table 4.16**.

Table 4.16. The description of indicators of software engineering aspects

No.	Indicator
1	Saya dapat mengoperasikan LKS ini dengan mudah

Student assessment results on the software engineering aspect obtained an average score of 4.38 for Student Worksheet Based Android from a maximum score of 5. Based on the ideal assessment criteria, the average score was in the range $\bar{X} > 4.188$, so that the aspects of software engineering fall into the category of Very Agree (VA). The percentage value of product ideality in the software engineering aspect is 87.6%.

Overall, it can be concluded that the products made in terms of software engineering aspects are very good and facilitate students in their use. This can be seen from the assessment of students who very agree that this Student Worksheet Based Android can be operated / used easily. The easy use of Student Worksheet can increase students' interest in learning.

4.2.3.2.7. Aspects of Implementation

The aspect of implementation has five indicators that the student should assess. The five indicators can be seen in **Table 4.17**.

Table 4.17. The description of implementation aspect indicators

No.	Indicators
1	LKS ini memberikan motivasi kepada saya untuk belajar
2	Saya menjadi lebih tertarik untuk belajar dengan adanya LKS ini

3	Saya lebih senang belajar dengan LKS ini daripada hanya mendengarkan penjelasan guru
4	LKS ini mengubah persepsi saya yang sebelumnya menganggap belajar kimia itu membosankan menjadi menyenangkan
5	Saya bisa menggunakan LKS ini untuk belajar kapan saja dan dimana saja

The results of the students' assessment on the aspect of implementation obtained an average score of 2.3 for Printed Student Worksheet and 4.34 for Student Worksheet Based Android from a maximum score of 5. Based on the ideal scoring criteria, the average score of Printed Student Worksheet entered in the range $1.812 < \bar{X} \le 2.604$ and Student Worksheet Based Android entered in the range of $\bar{X} > 4.188$, so the aspect of the implementation on Printed Student Worksheet included in the category Disagree (DA) and Student Worksheet Based Android included in the category Very Agree (VA). The ideality percentage of the product in the aspect of implementation for the Printed Student Worksheet is 47.2% and the Student Worksheet Based Android is 86.96%.

The result of the evaluation of motivation improvement and student self-learning on the aspect of the implementation gets the percentage value of unfavorable idealization for Printed Student Worksheet and very good for Student Worksheet Based Android. This can be seen from the assessment of students who choose not to agree that the Printed Student Worksheet can increase learning motivation. In contrast to Student Worksheet Based Android, student ratings on Student Worksheet is very positive, students feel motivated and prefer to learn with this Student Worksheet. Student Worksheet Based Android is also made in the form of offline applications, so users especially high school students class XI can run the application anywhere and anytime without any time limitation, even if it does not have internet connection.