Design of Teaching Materials Programming Basic C ++ Based on Sigil Software Learning Media

Rizky Amaliah¹*, Sri Ilyen²
¹Program Studi Pendidikan Teknologi Kejuruan, Universitas Negeri Padang, Indonesia
²Jl. Sutansoripada Mulia Gg. Melati 15, Padangsidimpuan, Indonesian
Corresponding Author: rizkyamaliahpohan93@gmail.com

INTISARI

Penelitian ini mengkaji tentang pembuatan media pembelajaran pemrograman C++ Menggunakan software sigil. Alasan dilakukannya penelitian ini adalah sebagai salah satu syarat pada mata kuliah Rancangan Pembelajaran Berbasis TIK. Tujuan studi ini adalah untuk menghasilkan sebuah media pembelajaran interaktif Electronic Publication (Epub) menggunakan software sigil. Proses Pembuatan media dirancang dengan menggunakan metode perancangan perangkat lunak model waterfall, meliputi: Perancangan, Desain Arsitektur dan Antarmuka, Pengkodean/Pemrograman, dan Pengujian. Pada media pembelajaran berbasis software Sigil ini terdiri dari Daftar isi, Materi pelajaran, Kuis atau latihan, Hasil skor kuis atau latihan. Uji kelayakan terhadap hasil pengembangan dan pembuatan materi ajar Bahasa pemrograman C++ software Sigil ini dilakukan menggunakan Pengujian black box testing. Hasil dari pengujian tersebut adalah Media Pembelajaran pemrograman dasar c++ berbasis software sigil ini berjalan dengan baik sebagaimana fungsi navigasi-navigasinya disetiap halaman, tidak ditemukan adanya kesalahan pada Media Pembelajaran pemrograman dasar c++ berbasis software sigil telah berjalan sesuai dengan tujuan yang diharapkan.

Kata kunci: pemrograman dasar, bahasa pemrograman c++, Sigil, epub,

ABSTRACT

This study examined the creation of C ++ programming learning media using Sigil software. The reason for this research is as one of the conditions for ICT-based learning design courses. The purpose of this study is to produce an interactive learning media Electronic Publication (Epub) using SIGIL software. The media creation process is designed using the waterfall model software design method, including: design, architectural design and interface, coding / programming, and testing. The Sigil software-based learning media consists of a table of contents, subject matter, quizzes or exercises, quiz scores or exercises. The feasibility test on the results of the development and making process material for Programming Language C ++ Software Sigil is done using a Black-box testing testing. The results of these tests are the basic programming learning media C ++ based on Sigil software running well as the navigation-navigation function in each page, no error in the basic programming learning media C ++-based Sigil software has run according to the expected goal.

Keywords: basic programming, C++ programming language, sigil software, epub
.

INTRODUCTION

The teacher's role is still very dominant. The teacher arranges the learning program, students just need to accept the learning design and information provided by the teacher. The teacher delivers the subject matter using conventional media, namely printed books, worksheets, and blackboards. In learning, it has not been supported by learning media that are easy to see and attract students' attention. This makes students bored with less motivation and the class becomes passive. Learning Media In the language of the media means "intermediary or introduction". In terms of media is any physical tool that can present messages and stimulate students to learn. [1]

Learning Media In the language of the media means "intermediary or introduction". In terms of media is any physical tool that can present messages and stimulate students to learn. Media are all kinds of components in the student environment that can stimulate learning. 16 Creative use of media will make students learn better and can improve their performance in accordance with the goals to be achieved. Media can be software or hardware. [2]

The use of instructional media should not be done carelessly because it must be adjusted to the formulation of instructional objectives, and of course it must be adjusted to the competence of the teacher itself.

The development of information and communication technology (ICT) has resulted in significant changes to the existing learning models and patterns. The development of ICT introduces paperless and mobile learning models and patterns such as e-learning, video conferencing, electronic books, and so on. This situation encourages someone to have tools (gadgets) such as computers, laptops, smartphones, and others [1]. This tool is needed in order to be able to access and run various learning media. These gadgets or hardware can be a tool that teachers can use in learning at school and make it easier for students to learn independently outside teaching and learning hours. With the sophistication of technology has changed people's habits to read. Reading used to have to carry books, but now reading can be done digitally in the form of a Digital Electronic Publication (Epub). [3]

Sigil is an open-source editor for EPUB e-books developed by Strahinja Marković in 2009 and maintained by John Schember since 2011. As a cross-platform application, it is distributed for Microsoft Windows, Mac OS X and Linux platforms under the GNU license. GPL. Sigil supports WYSIWYG and code editing based on EPUB files, as well as import of HTML and plain text files. [4]

Digital books, or also known as e-books, are publications consisting of text, images, and sound and are published in digital form that can be read on computers or other electronic devices [2]. A digital book is usually an electronic version of a printed book, but it is not uncommon for a book to only be published in digital form without a printed version.

Digital book formats are various, ranging from formats supported by large companies (PDF by adobe, swf by flash, doc by Word) and various other formats supported by certain digital book readers and devices. In 1990 the open e-book format was also developed which allowed publishers and software developers to use one format that could be read on any device and use a variety of digital book reader software [5]. On the other hand, the students' penchant for using an Android smartphone is on the current era certainly cannot be denied. This is a potential that must be exploited by educators in more creative and innovative learning. But the reality on the ground that the facility is not owned yet. This underlies the need for a development electronics-based modules that can be packaged in an android smartphone so can be read anywhere. In addition, it can reduce students' assumptions that Mathematics learning is boring. As stated by [6] that interesting learning media get a response good by students, especially in increasing student motivation. In addition [7] added that the media learning that is packaged in the form of computer animation and the like can reduce the level of anxiety of students in learning mathematics. Analysis description This need underlies the need for the development of e-module learning media with a scientific approach using software sigil.[6]

Interactive learning media is one way to learn using communication and information techniques. An interactive learning medium is a medium that delivers messages from teachers to students through the use of electronic media and the execution of applications. Interactive media learning helps to integrate learning materials, clarify learning processes, and improve time efficiency and teaching ability. We can actively communicate with each other in both directions during the learning process.[7][13]

There are innovations in developing teaching materials in learning driven by the development of e-book technology. Teaching materials can be transformed the presentation into electronic form is wrong the only one is a module. An electronic module can be defined as a tool learning designed electronically, contains interesting and systematic material to achieve an expected competency. On basically an electronic module adapts the characteristics, format and parts part of the print module in general.

METHOD

The design of basic c ++ programming teaching materials for this Sigil software uses the waterfall model. The stages of designing and making the

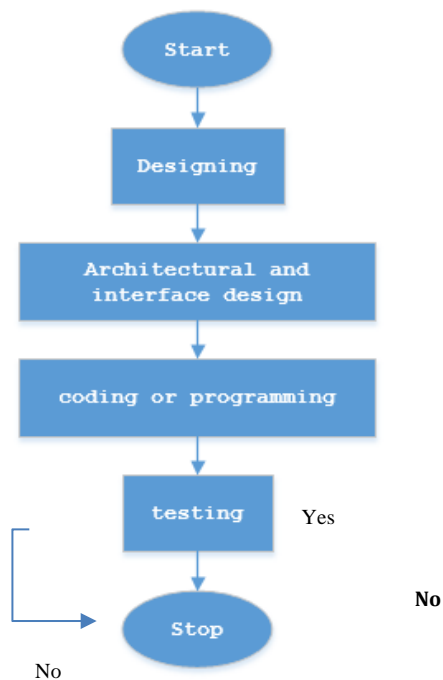waterfall model tool are described in the flow chart below [8]:

Figure 1. Flowchart of media design and manufacturing methods,

In making this learning media, the first step that must be done is, **Design** is to start designing an overview of what kind of media will be made, then **architectural and interface design** is designing how to design interfaces for users so that the learning media is easy to use, then **coding and programming** is to start making this media with sigil application with programing code and others [14], Further **testing** is after completion then this learning media will begin to be tested with the aim to check whether there are still errors or not and make repairs with code programming if they find flaws or errors in the media that is being made, then **stop** if the media has been jam done and ready to use.

Design

The design stage is the design stage of the learning media framework for the Basic C ++ programming material based on the Sigil software to be developed. Product design refers to the results of the needs analysis. The software system design that is made will be used as a reference for researchers in writing code. The product framework that is arranged as a guide for the stages of media creation and development includes [9]:

Navigation

The navigation structure is designed to facilitate the design of a learning media development flowchart. There are four types of navigation that are arranged in the development of this media which consists of an introduction flow, a table of contents, learning activities, exercises

1) Main Navigation Flow

This section will explain an overview of the menus on the main page and their navigation patterns. The main navigation flow for the media to be created is as follows:

Figure 2. Main Navigation Flow

2) Exercise navigation flow

This section describes how the navigation flows on the Exercise page. The following is the navigation flow from the Exercise page.
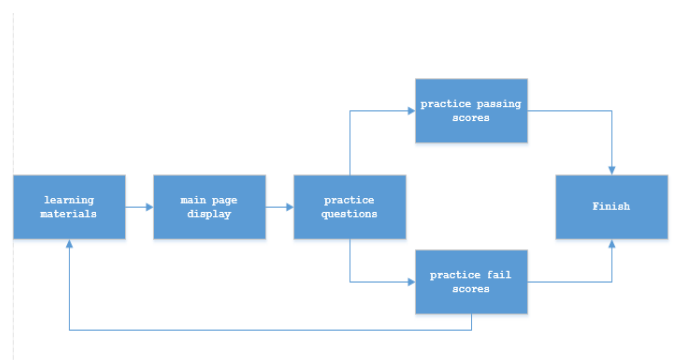

Figure 3. Evaluation Navigation Flow

b. Flow chart

Flowchart (flow chart) states the sequence of process activities in the media to be created which is described in symbolic form. Through a flowchart, detailed process steps can be described, complete with the activities that occur. The flowchart on the media that will be made consists of a flowchart to start learning media, an opening cover page, and an introduction in Figure 4 below
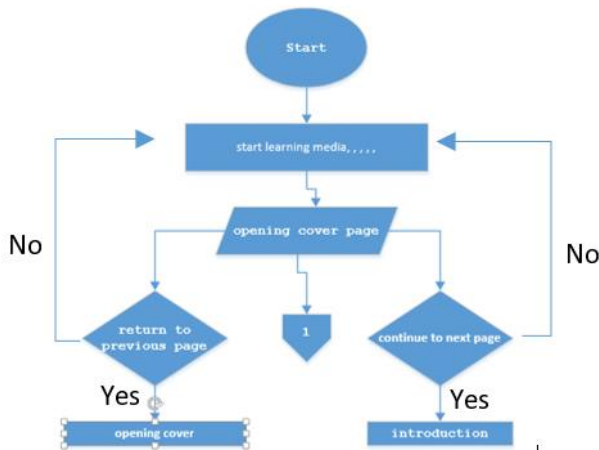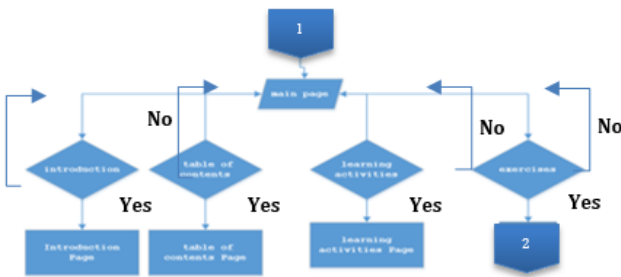
Figure 4. Opening page flowchart
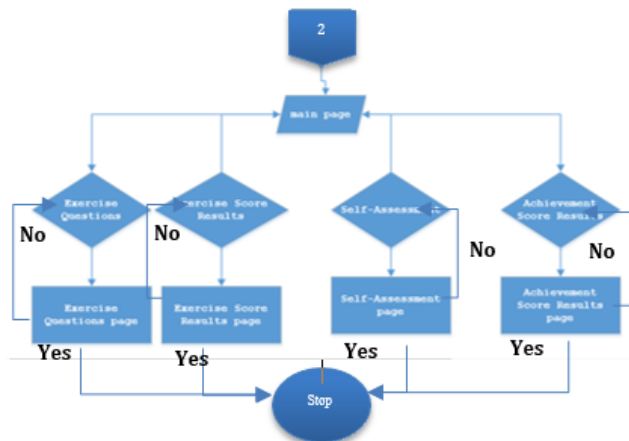

Figure 5. Main menu flowchart

Figure 6. Exercise page flowchart

RESULTS AND DISCUSSION

1. The Creative Process

The process of making learning media products uses Sigil software and making background objects using Photoshop CS6 software. Whereas for hardware needs using a laptop with the following specifications:

Table 1. Computer Device Specifications

Dell Latitude E7240 Laptop Device Specifications	
Processor	Intel ® Core ™ i5-4300U CPU @1.90GHz (4CPUs)
Memory	4.00 GB RAM
System Type	Windows 10 Pro
Hard Drive	128Gb
Display	14.0" LED
Graphic	Intel HD Graphics Family

The resulting product is an application program with an epub extension that can be run on a computer with minimum pentium IV specifications, 128 Mb of memory, and a monitor with a minimum resolution of 1024 x 768. With an application format with an .epub extension, this media can be distributed in the form of a Compact Disk (CD), via Flashdisk or other storage media that can allow users to learn independently.

The advantages of teaching materials made with this sigil software include,

1) learning media can be run on various computer devices,
2) the media is equipped with an evaluation question feature accompanied by a scoring to measure the ability to master the material
3) learning media allows users to be able to learn independently
4) has a display design that is quite good, neat,
5) easy to use.
6) Can be run on smartphones based on android
7) With this sigil software, people can create their own Epub and can share it for free

Whereas for the weaknesses of teaching materials made using Sigil in basic C ++ programming material,

1) Computer specifications have a big effect on the smooth running of the program when it is operated, this is indicated by the lag / crashes on some computer devices with low specifications
2) the scoring feature in the evaluation is still limited to multiple choice questions
3) You have to use the readium help app on desktop and epub reader on android to be able to run .epub extension files

2. Learning Media Performance

The black box testing method is software testing that is done by testing the functionality of an

application, without testing the program code. This test is done by running each input function in the application on several different computer devices with several repetitions. The following are the results of testing the functionality of the c ++ basic programming learning media application.[10]

It is necessary to add additional instructions for using media to maintain quality and to make it more user-friendly

Table 2. Black box testing of learning media on basic programming material c ++

ID	Field Test	Scenario Testing	Results Expected	Results Testing	Conclusion
1	Opening Cover	Pressing the Next Button Pressing the Next Button	Enter the next page Enter the next page	Enter the next page Enter the next page	Accepted
		Pressing the Back Button Pressing the Back Button	Enter Previous Page Enter the number before	Enter Previous Page Enter the number before	Accepted
2	Introduction page	Pressing the Next Button Pressing the Next Button	Enter the next page	Enter the next page	Accepted
		Pressing the Back Button	Enter Previous Page	Enter Previous Page	Accepted
3	Table of Contents page	Pressing All Titles and Subtitles	Enter the page according to the Title and Subtitles	Enter the page according to the Title and Subtitles	Accepted
4	Learning Activities page	Pressing the Next Button	Enter the next page	Enter the next page	Accepted
		Pressing the Back Button	Enter Previous Page	Enter Previous Page	Accepted
5	Exercise page	Complete multiple choice questions by selecting one of the options "a" to "e"	The button functions and only one must be selected	The button functions and only one must be selected	Accepted
		Pressing the Saved Button	Assessment Results In accordance with the results of the total number of true and false numbers on the practice questions that have been done	Assessment Results In accordance with the results of the total number of true and false numbers on the practice questions that have been done	Accepted
6	Assessment score results page	Push the button learn	Enter the page of learning activities	Enter the page of learning activities	Accepted
		Pressing the Table of Contents Button	Enter the Contents page	Enter the Contents page	Accepted
		Pressing the Next Button	Enter the Self-Assessment Page	Enter the Self-Assessment Page	Accepted
7		Filling in form	Can be filled without any constraints	Can be filled without any constraints	Accepted
		Pressing the Yes / No	The button is functional and only one	The button is functional and only one	Accepted
	Self-Assessment Page	Button on the table	of the "yes" or "no" is selected	of the "yes" or "no" is selected	
		Pressing the Check Button	Displays the Result Score achievement	Displays the Result Score achievement	Accepted
8	Self Achievement Score Results	Push the button learn	Enter the page of learning activities	Enter the page of learning activities	Accepted
		Push the button Repeat	Enter the page Exercises	Enter the page Exercises	Accepted
		Pressing Done	Enter the main page or cover	Enter the main page or cover	Accepted

The appearance of Sigil-based learning media products on basic C ++ programming material is as follows:

1. Cover page, on this page there is only some information about the material, author, initials of basic competencies and others.
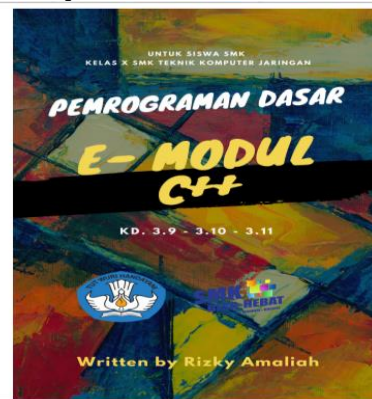

Figure 7. Opening page

2. The opening cover page, the opening cover page contains information related to the Title of Learning Media, the name of the author and the learning media validator, there is a back button and continue to the next page
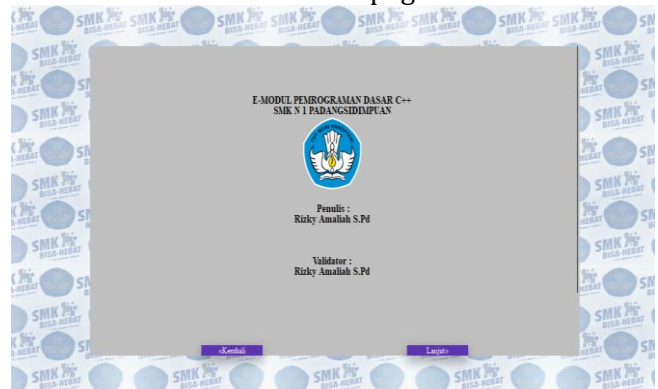

Figure 8. Opening Cover page

3. Introduction page, on this page there is an introduction to material, Basic Competencies, Achievement Indicators, there is a back button and continue to the next page
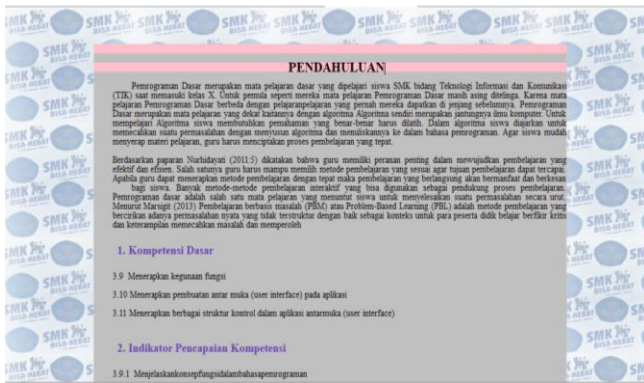
Figure 9. Introduction page

4. The Contents page, the Contents page contains the links for each page title or content on this learning media which when clicked can go directly to the respective destination pages
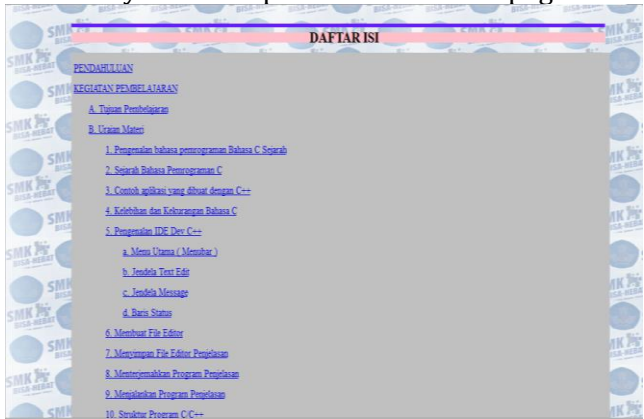

Figure 10. Contents page

5. The Learning Page, the Learning Page contains information related to learning material and there is a back button and a continue button on the next page
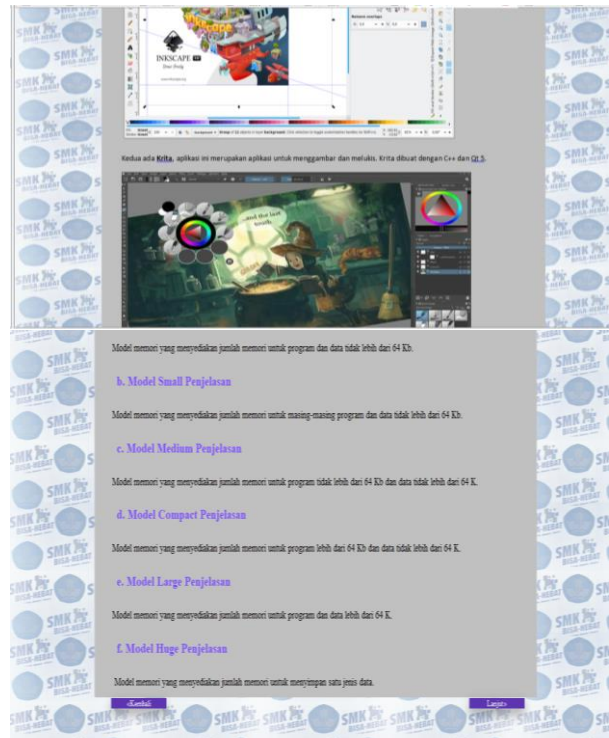

Figure 11. Learning Activities page

6. Exercise page, the practice page contains questions that must be done by users to measure the extent of mastery of the material that has been learned. In the training section, there is a training self-assessment form, feedback on the right and wrong answers, and at the end of the session there will be feedback in the form of pass and fail scores.
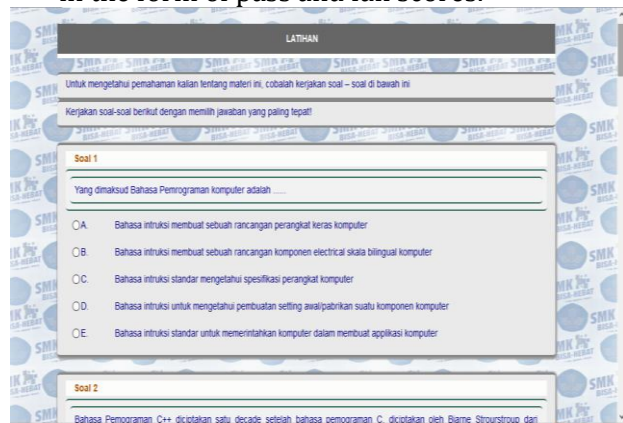
Figure 12. Exercise Page

7. Bibliography page, contains information related to information sources used for the content of this learning media.
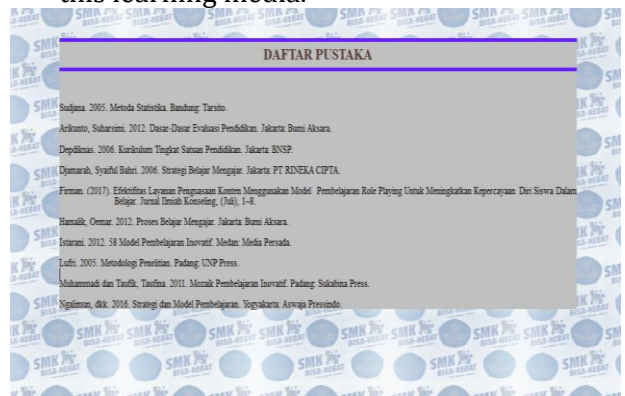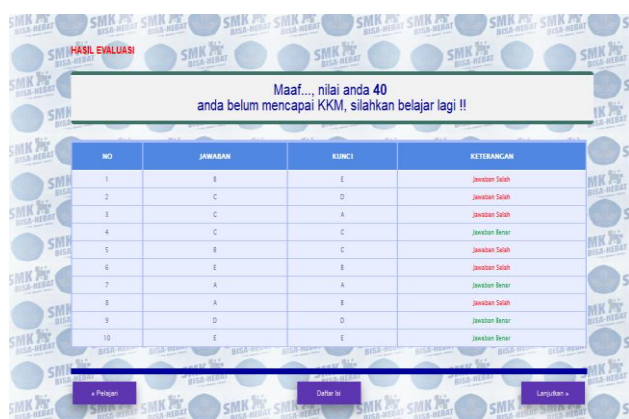

Figure 13. Bibliography page

CONCLUSION

In making this learning media, the first step that must be done is, Design is to start designing an overview of what kind of media will be made, then architectural and interface design is designing how to design interfaces for users so that the learning media is easy to use, then coding and programming is to start making this media with sigil application with programing code and others, Further testing is after completion then this learning media will begin to be tested with the aim to check whether there are still errors or not and make repairs with code programming if they find flaws or errors in the media that is being made, then stop if the media has been jam done and ready to use[11].

Based on the results of the test results using the Black Box Testing, it is concluded that: Learning media for basic programming c ++ based on sigil software runs well as the navigation functions on each page, There were no errors found in the Learning Media for basic programming c ++ based on sigil software, which has gone according to the expected objectives, It is necessary to add additional instructions for using media to maintain quality and to make it more user-friendly.

SUGGESTION

The development and manufacture of learning media is certainly far from perfect. For this reason, some suggestions are needed for this Sigil-based learning media, so that in the future improvements can be made, including the following:

Further research is needed related to this Sigil-based learning media. Furthermore, research can be carried out related to the effectiveness and practical value of the teaching materials that have been developed by direct trials of students / students.

For further researchers, it is necessary to develop in terms of aspects of the discussion of the material, especially related to deepening the material and if possible the discussion is not limited to one topic only. If the next researcher intends to implement it, it would be better if the discussion includes material for one semester so that the benefits of the teaching material that have been made can be maximized.

For further researchers, it is necessary to develop in terms of appearance aspects to make it more attractive and to add practice questions

REFERENCES

[1] Muh. Zein ,"Peran Guru Dalam Pengembangan Pembelajaran", *Journal Of Project Education*, Volume V, Nomor 2, Juli - Desember 2016

[2] Rasyid Hardi Wirasasmita, "Pengembangan media pembelajaran media berbasis buku digital elektronik publication (epub) menggunakan software sigil pada mata kuliah pemrograman dasar", *Journal of Project Informatics Education*, Volume 1, Nomor 1, Juni 2017

[3] N. Sudjana, "Penelitian Hasil Proses Belajar Mengajar." Remaja Rosdakarya, Bandung, 2009.

[4] Amalia, F, and R Kustijono, 'Efektifitas Penggunaan E-Book Dengan Sigil Untuk Melatihkan Kemampuan Berpikir Kritis', *Seminar Nasional Fisika (SNF)*, 2017

[5] Desmita Rohadatul 'Aisy, "Pengembangan e-modul Berbantuan Sigil Software Dengan Pendekatan Saitifik Pada Materi Sistem Persamaan Linier dua Variabel (WSPLDV)", *Journal of Project Informatics Education, Vol.* Vol.8 No.1; 2020

[6] Abdul Haris Rustaman, "Pengembangan Modul Digital Praktikum Komputer Grafis 1 Dalam Format *Elektonik Publication* (*EPUB*) Untuk Meningkatkan Pemahaman Teknik Grafis Mahasiswa Desain Komunikasi Visual (Topik: *Digital Imaging*), *Journal of Project Informatics Education*, JISIP. Vol. 3 No. 1 Maret 2019.

[7] M. Indonesia, "Merdeka Belajar Menuju Pendidikan Ideal," *18 Desamber*, 2019. Available: https://mediaindonesia.com/read/detail/278427-merdeka-belajar-menuju-pendidikan-ideal. [Accessed: 25-Jan-2021].

[8] A. Arsyad, *Media Pembelajaran*. Jakarta: PT. Raja Grafindo, 2015.

[9] Wahyu Nur Cholifah, "Pengujian Black Testing pada Aplikasi Action & Strategy Berbasis Android Dengan Teknologi Phonegap", *Journal of Project Informatics Education,* Vol. 3 No.2 Desember 2018

[10] A. D. Samala, B. R. Fajri, and F. Ranuarja, "Pemrograman C++, The Beginning: from Zero to One." UNP PRESS, 2021.

[11] A. Harahap, A. Sucipto, and J. Jupriyadi, "Pemanfaatan Augmented Reality (Ar) Pada Media Pembelajaran Pengenalan Komponen Elektronika Berbasis Android," J. Ilm. Infrastruktur ..., 2020, [Online]. Available: http://jim.teknokrat.ac.id/index.php/teknologiinformasi/article/view/266.