Utilization Exe-Learning in Development E-Teaching Module for Independent Curriculum in Learning Informatics Network Material Computer

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Abstract: Technology has been applied in various areas of life, including education. Technological advances provide students with more materials and lessons to help them learn more efficiently. One application that can be used to create e-learning modules that optimize digital media. In the Exe learning program, teachers can develop modules to add text, images, and videos and create multiple-choice questions. The development of learning media using the ADDIE model includes analysis, design, development, implementation, and evaluation, and it involves class X students of Computer Networks at SMKN 1 Sepulu as research subjects. Data was collected through observation, interviews and tests. Data analysis was carried out using descriptive and qualitative methods. Two expert validators, material experts and media experts, carried out the validation. The data collection technique uses a questionnaire. Validation results from material experts meet the requirements of 93%, which means they are very valid. The media expert results meet the requirements at 96%, which means they are valid. At the implementation stage, a trial was carried out. The results of field trials on 10th-grade Computer Network students showed that as many as 30 students obtained an average score of 92.6% with excellent qualifications, which means this media is easy for students to learn. The test results of EXE-based learning media show that the media is very suitable for use as a computer network learning medium and helps students in teaching and learning.

Abstract: Teknologi telah diterapkan dalam berbagai bidang kehidupan, termasuk pendidikan. Kemajuan teknologi memberi siswa lebih banyak materi dan pelajaran untuk membantu mereka belajar lebih mudah. Salah satu aplikasi yang dapat digunakan untuk membuat modul e-learning yang mengoptimalkan media digital. Pada program pembelajaran Exe, guru dapat membuat modul dimana mereka dapat menambahkan teks, gambar, video dan membuat soal pilihan ganda. Pengembangan media pembelajaran menggunakan model ADDIE meliputi: Analisis, Desain, Pengembangan, Implementasi dan Evaluasi dan melibatkan siswa kelas X Jaringan Komputer SMKN 1 Sepulu sebagai subjek penelitian. Data dikumpulkan melalui observasi, wawancara, dan tes. Analisis data dilakukan dengan metode deskriptif dan kualitatif. Validasi dilakukan kepada dua validator ahli yaitu ahli materi dan ahli media. Teknik pengumpulan data menggunakan angket Hasil Validasi ahli materi memenuhi syarat 93% yang artinya sangat valid, hasil ahli media memenuhi syarat 96%yang artinya valid. Pada tahap implementasi dilakukan uci coba. Hasil uji coba lapangan yang dilakukan kepada siswa Jaringan Komputer kelas 10 sebanyak 30 siswa memperoleh nilai rata-rata 92,6%dengan kualifikasi sangat baik, yang artinya media ini mudah dipelajari siswa. Berdasarkan hasil pengujian media pembelajaran berbasis exe menunjukkan bahwa media sangat layak digunakan sebagai media pembelajaran jaringan komputer dan membantu proses belajar mengajar siswa.

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A. Introduction

In the era of revolution industry 4.0, education No Again can ignore the role of technology information and communication in the learning process. Digital transformation has brought change in various life aspects, including education. In terms of this, it is important to notice How technology can be used to increase quality learning and prepare to face future demands; according to research by Amelisa et al (2023), using technology information in learning positively impacts motivation. Study students and academic results. This shows that integrating technology information in the learning process needs to be more relevant and supportive of achievement-objective education in a more effective way. Edi (2022) stated that teaching materials can also be interpreted as all materials arranged systematically that allow students to learn independently and are designed to follow the applicable curriculum.

Knowledge and technology have significantly changed various aspects of life, like the economy, health, education, communication, environment, security, transportation, and culture. According to Lestyaningrum et al (2022), technology has revolutionized paradigm learning by introducing tools to help teaching that support the learning process. In this context, technology development has influenced educational environment learning, reflecting transformation with a more innovative approach and using technology as a tool for effective learning.

Technology has changed the way classrooms look and operate. According to research, modern classrooms are now equipped with various digital tools and resources that facilitate learning and increase student engagement (Subroto et al., 2023). Today's teachers are expected to have skills in using educational technology in the classroom (Tondeur et al., 2019).

The Learning and Assessment Guidelines state that the creation of teaching modules is often done to create teaching resources. Teaching aids serve as a guideline for educators to carry out learning by meeting specific criteria according to the needs of student characteristics. Print and smartphone technology can now be used simultaneously in teaching and learning activities thanks to the development of electronic module technology (Digital Teaching Modules). To meet the learning objectives in learning units delivered in electronic form, digital teaching modules can be viewed as one type of independent learning material (Etfita & Wahyuni, 2020).

One of the applications that can be used in creating e-modules that optimize digital media is *exe-learning* (Muzijah et al., 2023). According to Ardliabzi (Jahro & Ridho, 2015), the Exe Program is a web-based design program designed to help and display web-based lessons and teach materials without requiring special skills in HTML, XML or web application programming skills. In the *Exe-learning program*, educators can create a module that can be inserted with text, images, videos, and multiple-choice questions so that educators can apply innovations in the program (Purnomo et al., 2023). Research on the development of Android-based applications for learning media has also been conducted (Sari & Ali, 2019) stating the weaknesses of the developed learning media, including not being able to be operated on mobile devices with operating systems other than Android,

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three-dimensional building animations are not yet in 3D animation; and media interactivity is still lacking (Rahmanto & Hotijah, 2020). Another study conducted by Copriady stated that there was a significant difference in the motivation and learning outcomes of students who were taught using problem-based learning strategies compared to those who were taught using problem-based learning strategies integrated with the *eXe Learning program computer media* (Kartini & Putra, 2020).

According to Junaidi (2019), the learning process taught in design learning involves several important components: objectives (desired results), material (content learning), method (way teaching), media (tools supporters), and evaluation (measurement achievement). All components work together to create a practical learning experience. Learning media is one of the elements important in this process Because it is used To convey material to students. The selection of appropriate and careful learning media can significantly impact learning effectiveness. Good media can help students understand and internalize material with more suitable, making learning more engaging and interactive. Therefore, selecting and using appropriate learning media with objective learning and characteristics of students is very important in creating effective learning, such as book text, images, videos, and devices for soft learning (Dewi & Handayani, 2021).

However, the reality on the ground often still needs to reflect the potential for complete technology information in education. Some factors like limitations in access, lack of digital skills among educators, and challenges in infrastructure still need to be improved in the utilization of technology information in learning. In this context, developing multimedia learning based on Exe-learning can become an effective solution. By using an existing platform known and familiar to many students, multimedia learning based on Exe-learning can increase the involvement of students and enrich their experience.

Thus, the development of learning multimedia Android is a solution technology and a strategic step in comprehensively increasing quality education. In an increasingly connected digital era, it is important to keep going, be innovative, and adapt to the development of the times to ensure that education is still relevant and effective in preparing generations to face future challenges. With this approach, it is expected that education can become a driving force for progresssocial and economic progress and give more opportunities for all individuals to succeed in life. In terms of This, the development of learning multimedia Android can become an important beginning in building a more education-strong and inclusive foundation for a better future (Hidayat et al., 2021).

Development technology information moment This has covered almost all field life, not including field education. Education that utilizes technology information has 2 advantages. First, as the driving force of world education, teachers are also expected to be more appreciative of maximizing potential education, and second, to give more opportunities to students to utilize every potential they have. The availability of media, technology, resources, and an adequate learning environment help students learn (Pradana et al., 2020). In education, learning media is important for achieving objective learning at school. Using learning media like boards and books already causes saturation in students. Therefore, alternative media can be used to support learning. Students can feel interested in the media used by educators, which can reduce saturation in the learning process.

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Based on results observed at SMKN 1 SEPULU, in particular class X, there is no use of learning media in the learning process, especially on a learning network computers. The problem makes researcher development of learning multimedia Exe-Learning based for overcome problem limitations of visual media as well as the Amount less android usage beneficial in learning with utilize smartphone technology owned student as a learning medium that can be used facilitate the student in learning and be able to increase results Study student. Study development This is done to renew and become a new solution in using learning media, rated as still conventional. In addition, each other reminds teachers that it is essential to utilize and update media to support the learning process to be more effective and efficient based on current developments.

B. Method

This study uses a developmental research approach. This approach is used in the ADDIE model (Analyze, Design, Development, Implementation, Evaluation) (Asmayanti, 2020). The ADDIE development method in its stages can be seen in the following image:

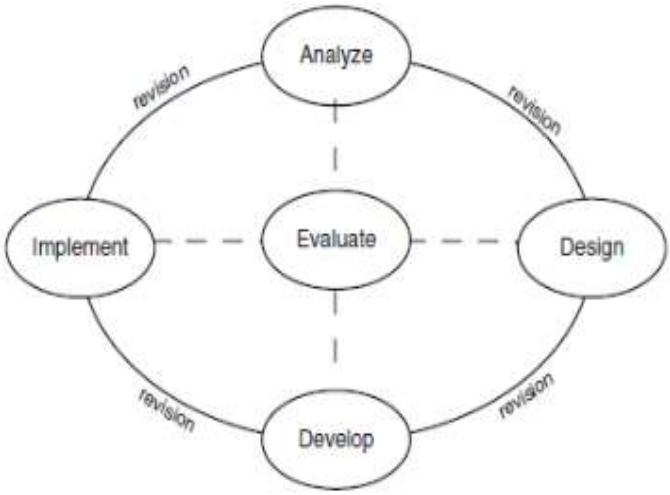

Figure 1. ADDIE Development Model (Asmayanti, 2020)

The complete research flow using the ADDIE model can be described in the following table:

Table 1. Stages of Development Activities and Research Results

No	Activity	Results
1	Analysis: This process is the stage of analyzing various aspects used in application development. This study analyzes the learning needs for Network material. Computers in class X of SMKN 1 Sepulu.	The results of interviews and observations were used for the application.
2	Design: On stage, This is the process of design development for multimedia Android-based learning. At this stage, all displays will be designed from start to finish.	Application design plan
3	Development: This process is the stage of development or realizing the design. In this study, the	Validated applications

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	exe-learning web application is used. In addition to validating the application results to obtain eligibility from the Expert Validator and perfecting the application if there are revision notes from the expert validator	
4	Implementation: On stages implementation in study This is the stage for implementing multimedia learning based on *exe learning*, which has developed in real situations in the classroom. During implementation, multimedia *exe-learning*-based learning that has been developed is applied to existing conditions. Material teaches what has been developed and delivered by learning.	Results of the application trials that have been carried out
5	Evaluation: Evaluation is the step from model design system learning ADDIE. Evaluation is a process that provides value to development module learning based on web learning.	Improvements according to evaluation results

There are several considerations in media development so that the media created is declared suitable for use in learning, namely through the validation stage. Validation of the development application includes validation by experts, individual trials, small group trials, and large group trials. At this stage validation expert, a questionnaire was given to two validators: expert materials and media experts—a trial individual conducted at SMKN 1 Sepulu involving three students. Students will given an application in the form of exe-learning learning media, then play the application said, and assess the application using a questionnaire. The trial phase group involves six students who do the same activity as a trial individual. Significant activities were still the same in the testing group, but the respondents used 30 students. The instrument was used in the form of a questionnaire with several questions. After stage validation and testing of the application, the data obtained will analyzed. Based on the test results validation, the repair was done as part of the stage evaluation of the research model used. The data obtained from the study covers evaluation from media experts, expert material, and response student class X SMKN 1 Sepulu. Validity and response tests are essential for getting eligibility data for the exe-learning learning media application. Data analysis was carried out using quantitative evaluation with provisions that can be seen in Table 2.

Table 2. Information Mark Score
Source: modification (Lamada, 2020)

Category	Score
Very In accordance	5
In accordance	4
Enough In accordance	3
It is not by	2
Very No In accordance	1

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C. Result and Discussion

Result

In this research, it is a type of development research that has results. In module l, *exe-learning* is used in the learning process, especially in material Computer Networks. Application This is developed with a base web, which can be used as an infrastructure for activity learning. In development applications, This can help develop innovation module learning, Which can used by Teachers in face development technology more rapidly. In development multimedia based on Android. This use model development ADDIE with 5 The stages include:

1. Level Analyze

This analysis was done for students SMKN 1 BOBBIN class X . They do not use learning modules in the learning process, especially in learning about material computer networks. However, students can use the laptop/PC provided in laboratory computers during learning to search for learning materials, but many students do not use it well.

For the problem, the researcher developed module learning based on the web to overcome problem limitations in medical learning.

a. Analysis Content Requirements/Content

In the needs analysis, in this case, a learning module is needed, which can help teachers in the learning process and utilize the web, but it still needs to be used in a maximum way. For analysis, we need this, especially on material from the Network Computer.

b. Analysis Need Software (Device Soft)

Analysis need on stage This develops module learning and can accessed using a laptop/PC. Where utilize *software Exe-Learning.*

2. Level Design (planning)

Learning module with Network One user operates this computer. The user in operation web This is used for doing orders and will run by the system so that students can look for information from material included in the application without any time limit for each menu. At the design stage, module learning is based on *exe learning*. This will be explained with the following:

a. Storyboard

A storyboard is a depiction of a scenario that is created in stages. Namely, with each scene arranged to explain let us multimedia learning, Which is explained in Table 3 following:

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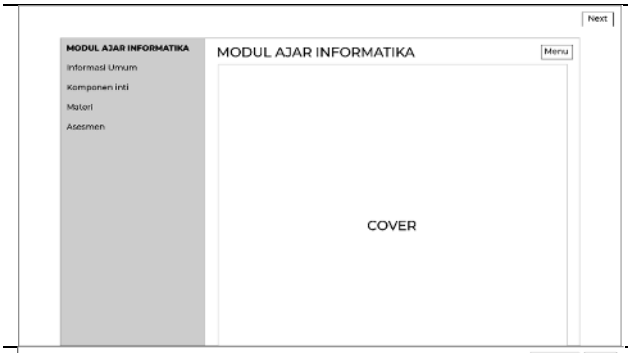
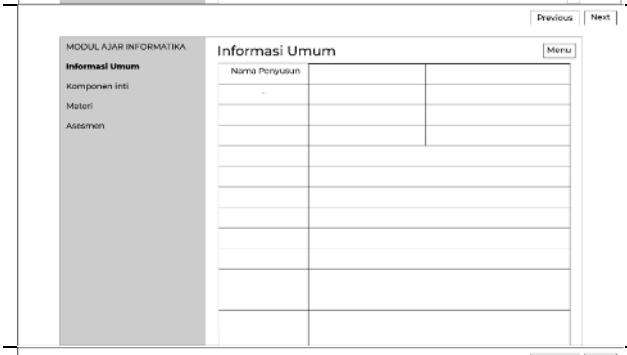
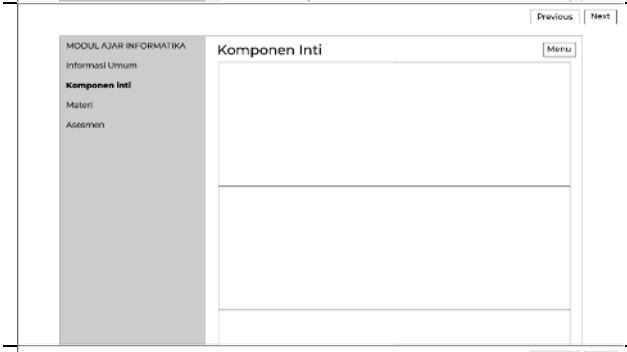
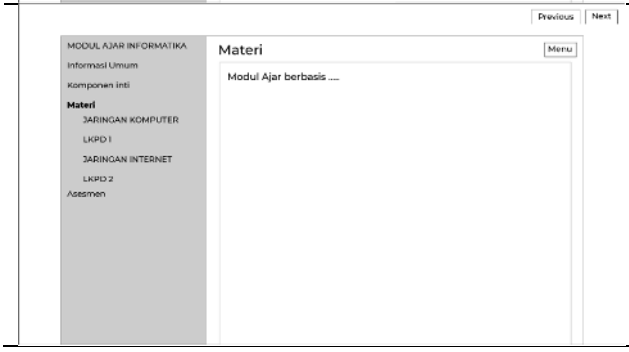
Table 3. Storyboard Table for Learning Media Design

Design	Information
	The following display is the initial display of the e-module when it is first opened, which only contains the cover of the e-module. On this display, there are several buttons, namely the arrangement of the e-module, menu, and next button.
	The following display appears when we select the general information menu or press the next button on the initial display. The following display will display a general information table in the form of the compiler's name, the school's name, the phase, and other information concerning the material presented in this module.
	The following display, namely the core components, is the part that will display things like learning objectives, meaningful understanding, and trigger questions.
	The following display is the material section. In this section, an explanation of this module, which is an ARCS-based teaching module, will be displayed.

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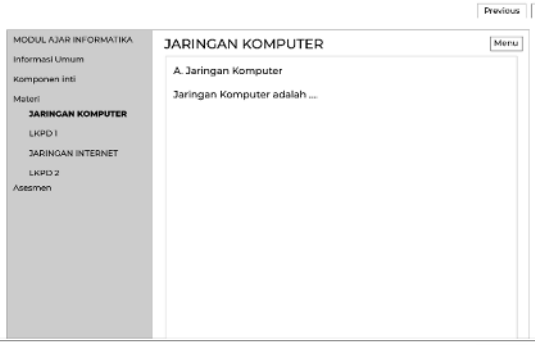
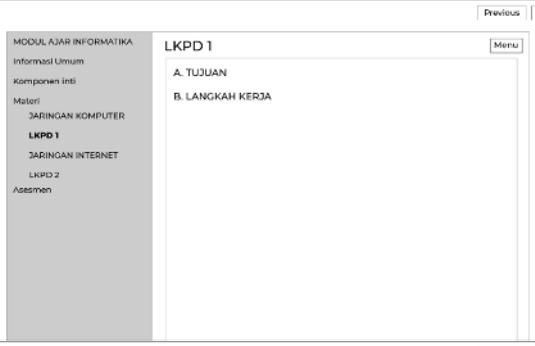
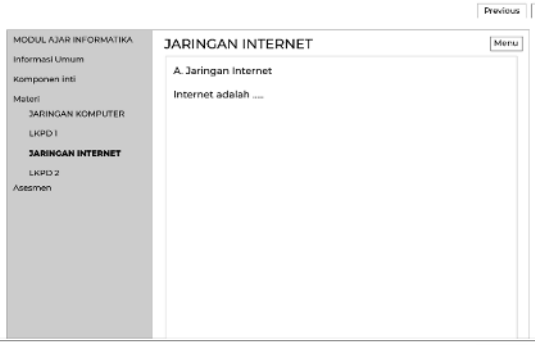
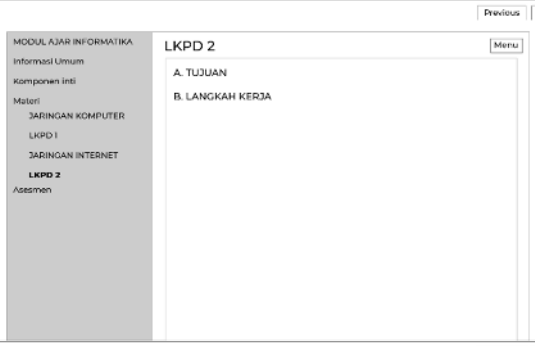
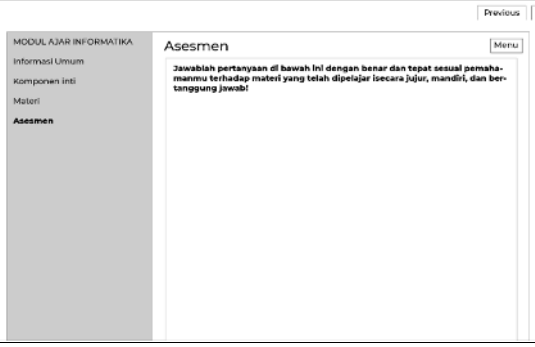
Design	Information
	Next is the material section's content; the first material is computer networks. This first material will explain computer networks and their devices, equipped with images and videos to support understanding.
	Next is student worksheet 1, a student worksheet containing questions about the first material.
	The following display is the Internet network material section. This second material will explain how the internet works and how to configure a network.
	Next is student worksheet 2, a student worksheet containing questions referring to the second material.
	The last part is the assessment. This part is the part that contains questions about the 2 initial materials that have been distributed.

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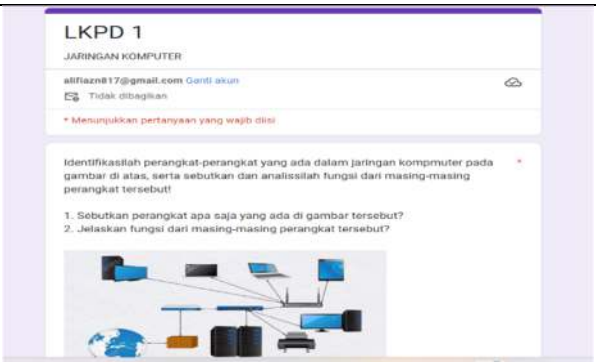
Design	Information
	Following is a foam that can accessed by students in filling Answers. Each has a Google foam answer for student worksheet and assessment.

3. Stage Development

After going through the design process, the next stage is development. This stage produces module learning based on *exe-learning* according to user needs. After multimedia learning development, experts will test it to determine the eligibility for multimedia learning applications before implementing them on students in general. Direct. The researcher used two test try expert that tests to try expert media and expert material with results application And results validation as follows:

Figure 2. Results of the Exe-Learning Learning Module

a. Results Validation Expert Media

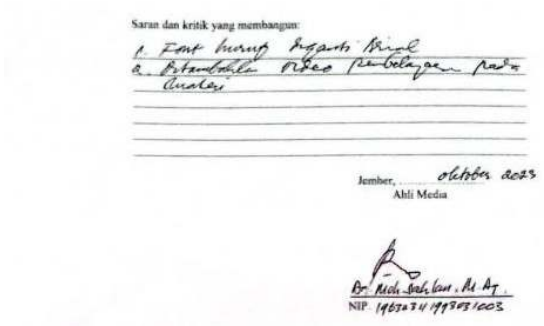


Figure 3. Notes Media Expert Validation

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Validation of expert media is done to validate the expert by his field. Where the researcher conducted media expert validation on Mr. Dr. H. Moh Sahlan, M.Ag. He is a lecturer at the Kiai Haji Achmad Siddiq State Islamic University (UIN KHAS) Jember. Apart from that, he is the secretary of the senate of Kiai Haji State Islamic University. Achmad Siddiq (Special State Islamic University) Jember.

Results evaluation was obtained in the form of sheet validation. Then, a calculation was made to determine the percentage of validity results developed in the media. Results validation expert media will be counted with the following formula:

Tabel Penilaian Desain Pengembangan Multimedia Interaktif berbasis Android

No	Indikator	Skala Penilaian			
		1	2	3	4
1.	Kejelasan petunjuk penggunaan				✓
2.	Kemudahan menggunakan multimedia interaktif berbasis android dalam praktik pengajaran			✓	
3.	Membantu mempermudah pemahaman materi				✓
4.	Membangkitkan motivasi siswa dalam belajar				✓
5.	Kesesuaian jenis dan ukuran huruf dengan karakteristik siswa			✓	
6.	Kesesuaian narasi dengan karakteristik siswa				✓
7.	Kesesuaian tampilan gambar dengan karakteristik siswa				✓
8.	Kesesuaian *sound* dengan karakteristik siswa			✓	
9.	Kesesuaian musik pengiring dengan karakteristik siswa				✓
10.	Kesesuaian tampilan multimedia interaktif dengan karakteristik siswa				✓
11.	Runtutan multimedia interaktif yang ditampilkan				✓
12.	Kualitas tampilan multimedia interaktif				✓
13.	Evisiensi penggunaan multimedia interaktif dalam kaitannya dengan waktu			✓	

Sumber: Hasil olahan Peneliti dari Akbar (2011:227)

Aspek pengembangan multimedia Interaktif berbasis Android

Petunjuk:

Apabila terdapat kesalahan atau ketidaksesuaian pada tampilan misalnya, ukuran huruf, gambar, narasi, *sound*, musik pengiring, ilustrasi, dll mohon dituliskan pada kolom kesalahan sebagai perbaikan dari pengembangan multimedia Interaktif berbasis android. Selain itu mohon dituliskan saran dan kritik yang membangun demi kesempurnaan pengembangan multimedia interaktif berbasis android yang akan dibuat.

Figure 4. Media Expert Validation Results

$$Instrumen\ Validation = \frac{Score\ Obtained\ x\ 100\%}{\sum Maximum\ Score}$$

Based on Figure 4, we can withdraw the conclusion that the device produced in the form of a module learning based on *exe learning on* network material computer, the validator giving a score of 48 with a percentage, so that it obtained the average value of the validator percentage is 9.6 %, and if converted based on the table percentage validity so included in the category very valid.

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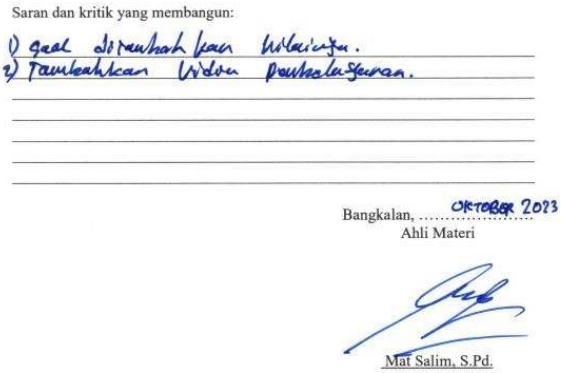
b. Results Validation Expert Material


Saran dan kritik yang membangun:

1) Soal ditambah lagi latihannya.
2) Tambahkan video pembelajaran.

Bangkalan, OKTOBER 2023
Ahli Materi

Mat Salim, S.Pd.

Figure 5. Notes Subject Matter Expert Validation

Validation expert material was done by the teacher guardian of the eye lesson network computer Class X SMKN 1 SEPULU, namely Mr. Mat Salim, S.Pd. Data was obtained from expert validation material in the form of sheet validation, Which later became reference eligibility material and was used in module learning based on *exe learning on* network material computer. Sheet validation consists of a 10-grain statement with a range score of 1 – 4 per item. Results The assessment from the validation sheet is then calculated to determine the percentage validity material used for the results. Following **Fig. 6** is the results of the validation material expert:


Tabel Penilaian Materi/Isi Pengembangan multimedia Interaktif berbasis android

No	Indikator	Skala Penilaian			
		1	2	3	4
1.	Kesesuaian SK, KD, Indikator dengan media yang dikembangkan				✓
2.	Kebenaran materi yang ada pada Praktik Dan Konfigurasi Penyambungan Kabel				✓
3.	Kedalaman materi yang ada pada multimedia Interaktif berbasis android			✓	
4.	Pentingnya materi yang ada pada multimedia Interaktif berbasis android				✓
5.	Kemenarikan media sesuai dengan karakteristik siswa			✓	
6.	Penggunaan bahasa yang sesuai dengan karateristik siswa				✓
7.	Konsep yang diberikan dapat dilogikakan dengan jelas				✓
8.	Materi mudah dipahami				✓
9.	Kesesuaian materi dengan karakteristik siswa			✓	
10.	Kemampuan multimedia dalam memberikan gambaran nyata tentang materi yang dipelajari				✓

Sumber: Hasil olahan Peneliti dari Akbar (2011:178)

Aspek pengembangan multimedia Interaktif berbasis Android

Petunjuk:

Apabila terdapat kesalahan atau ketidaksesuaian pada tampilan misalnya, kesalahan konsep, susunan kalimat, kebenaran arti kata, dll mohon dituliskan pada kolom kesalahan sebagai perbaikan dari pengembangan multimedia Interaktif berbasis android ini. Selain itu mohon dituliskan saran dan kritik yang membangun demi kesempurnaan pengembangan multimedia Interaktif berbasis android yang akan dibuat.

Figure 6. Results of Validation by Material Experts

Results evaluation obtained from sheet validation. Then, the calculation was made to determine the validity percentage of the material used. Results validation expert the material will counted with the formula following:

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$$Instrumen\ Validation = \frac{Score\ Obtained\ x\ 100\%}{\sum Maximum\ Score}$$

Based on Figure 6, we can withdraw the conclusion that the device produced in the form of a module learning based on *exe learning on* network material computer, the validator giving a score of 37 with a percentage, so that it obtained the average value of the validator percentage is 9.3 %, and if converted based on the table percentage validity so included in the category very valid.

4. Stage Implementation

On stage, This is process implementation module learning based on *exe learning on* network material computer. Where this stage is carried out on day Wednesday, 0 8 November 2023, with an Amount of 30 Respondents producing ∑ x on still each Respondent by exposed in Table 4 following:

Table.4 Results Questionnaire Respondents

No	Respondents	Results	No	Respondents	Results	No	Respondents	Results
1	Fauzan	68	**11**	Ariel W	69	**21**	Amrullah	66
2	Noval	69	**12**	Andes FP	72	**22**	Rahmaniya	67
3	M. Irfan	70	**13**	Arifin S	71	**23**	Reno DS	74
4	Parihah	62	**14**	Lia S	69	**24**	M. Rijal	74
5	Shohibul B	74	**15**	Muhridatul R	72	**25**	Lunah Latul L	73
6	Syahrul Z	75	**16**	Ferdy AS	73	**26**	Julia A	72
7	M. Anasrullah	72	**17**	Lysis In Suganda W	64	**27**	Haud	69
8	Husni M	75	**18**	Sifa	66	**28**	Faisal G	68
9	Ferdi H	64	**19**	Maslahah	65	**29**	Mahsus	66
10	Ramadani	66	**20**	Faidatul H	71	**30**	Diky A	69

Calculation mark questionnaire, Which was produced on test try user module learning based on *exe learning* with assessment criteria as the following:

Table 5. Information Mark Score
Source: modification (Lamada, 2020)

Category	Score
Very In accordance	5
In accordance	4
Enough In accordance	3
It is not by	2
Very No In accordance	1

The *User Acceptance Test* (UAT) results will produce data in the form of student

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answers or results questionnaires processed by adding up all the answers for each Respondent. After that, all the results will be added up. Questionnaire Respondents in Table 4 produced the total overall questionnaire. Amount to 2,085. If the total overall questionnaire so will do process calculation based on the formula:

$$Percentage\ Answer: \frac{\sum x100\%}{\sum SMI}$$

Information:
$\sum$ x = Amount Score
SMI = Score Maximum (Weight mark highest multiplied by of respondents)

Table 6. Validity Percentage Table
Source : modification (Wati et al., 2019)

Level Achievement	Qualification	Information
90% - 100%	Very Good	Very Valid, No Need Revised
75% – 89%	Good	Valid, Revised Necessary
65% - 74%	Enough	Enough Valid, Enough Lots Revised
55%-64%	Not enough	Not enough Valid, Lots Revised
0	Very Not enough	Very Not enough Valid, Revised Total

Based on the results of testing conducted on respondents of class X SMKN students 1 TEN can conclude that in a way, overall evaluation module learning based on *exe learning on* network material, the computer obtains results that meet all aspects starting from the aspect material, media aspects and feasibility by obtaining a score of 92.6% which is at category very valid And No need revised. So, product education in the form of module learning based on *exe learning on* network material computer can be said worthy Of use.

Discussion

Exe-learning learning media is a learning media that was made through a feasibility test process by material experts and media experts, which was then tested directly on students. Based on the test results by material experts, the value obtained was 9.3 %, and the category is very valid, thus indicating that the material used is by the Subject Teacher. The second product test is a test by a media expert. In this test, the exe-learning learning media obtained a percentage of 9.6 %. If converted based on Table 3, the percentage validity included in the category very valid does not require revision.

Trials user involving 30 students of SMKN 1 Sepulu with the same instrument. The result shows that a presentation of as big as 92.6% who entered valid and invalid categories needs revision. Indicators assessed are (1) the attractiveness of learning media by 91%; (2) the benefits of learning media by 90%; (3) trust towards learning media by 90%; (4) satisfaction towards learning media by 90%. Based on a series of validation and testing done and referring to the criteria evaluation according to Cahyani (2021), overall results generally state that the learning media developed is worth using in learning students.

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D. Conclusion

The Independent Curriculum teaching module is essential for successfully implementing learning with a new model or paradigm, mainly associated with transforming the industrial and digital revolutions. The Independent Curriculum Teaching Module touches on various media tools or facilities, techniques, instructions, and guidelines made methodically, attractively, and precisely according to student demands. This research is a type of research (R&D). It uses the ADDIE method in its development, which has 5 stages, namely the analysis stage (*Analyze*), the design stage (*Design*), the development stage (*Develop*), the implementation stage (*Implement*) and the evaluation stage (*Evaluate*) (Sugihartini & Yudiana, 2018).

In the study, products were produced, and validity tests were carried out on material and media experts. The study's interim results obtained a material validation value of 93% with a very valid category and media validation of 96% with a very feasible category. From the product validation activities that have been carried out by material experts and media experts that have been carried out, it can be concluded that the Utilization of *Exe-Learning* in the Development of *E*-Learning Modules for the Independent Curriculum in Informatics Learning Network Materials Computer Class X at SMKN 1 Sepulu is valid for use in learning, In this research furthermore done and implemented to more Lots subject research and update application yanhg used which has more Lots feature.

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