# DEVELOPMENT OF INTERACTIVE LEARNING MEDIA WITH THE ASSISTANCE OF GOOGLE SITES ON ARRAY MATERIALS AT SMK NEGERI 1 MUARO JAMBI

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## ARTICLE INFO

**Abstract.** One of the main learning problems is the tendency to lack appropriate and comprehensive content in interactive learning media. Array materials require a clear and complete explanation of the basic concepts, operations, and applications in programming. The purpose of this research was to develop interactive learning media and determine the level of feasibility and attractiveness in supporting the learning process. The research method used was Research and Development. The research subjects were students from SMK Negeri 1 Muaro Jambi. The alpha test results from multimedia experts amounted to a percentage of 80%, the learning media was considered feasible with the need for minor revisions and the data from the assessment by material experts which showed a very good category and obtained a percentage of 97.08%. The beta test data, namely the subject teacher's assessment of the learning media, obtained a percentage of 96% so that it could be categorised as feasible to use as a learning media and the results of the questionnaire of students in class X TKJ I and X TKJ II both obtained a percentage of 89% with a very feasible category. From the data obtained, it could be concluded that that Google site learning media on this array material could be used and supports the learning process.

## INTRODUCTION

The current digital era is characterised by technological advances to address the complexit of social issues (Sumandya & Widana, 2019). The development of education in Indonesia has begun to emphasise problem-solving, collaborative, communicative, critical thinking and digital literacy skills. Education must be able to keep up with the rapid development oftechnology. Innovations in technology using computers and the internet are now widely used to support the educational process both inside and outside the classroom. The purpose ofusing technology must be applied correctly to help facilitate learners to learn. Changing needs in the world of work also have a significant impact on education. Innovation in technology development is needed to improve the effectiveness of the learning process (Hidayatullah et al., 2022).

In general, the focus of learning is only centred on the teacher, but as the times change, learning is more flexible for learners to actively understand the material (Maslinawati, M., 2021). Teachers are no longer the only source of knowledge, but play more of a facilitator role in the learning process. The reference to the development of education that prioritises the learning paradigm to improve the ability to think based on logic and rationality, and teach skills to overcome problems independently in learning (Yuliati, 2017).

Based on interviews with teachers, learning activities are usually only in the classroom which requires students to always focus on following the learning process to obtain optimal knowledge. Whereas the material for basic programming subjects needs to be balanced between learning material in the classroom and direct practical learning in the computer laboratory. However, it is constrained by the limited number of computer laboratories so that their use must alternate with other classes, so learning usually only occurs in class with the teacher explaining the material with learning resources using only a textbook .

Based on the results of the initial observation questionnaire to students, 73.9% of students felt that the material in basic programming subjects was quite difficult material and as many as 47.5% of students felt that they did not understand the learning process delivered by the teacher. In the class, the teacher only used the lecture method in delivering material without using learning media as a supporting tool in learning. The long learning process made students' enthusiasm and interest in learning decrease, especially when there was previous material that had not been understood, students would easily lose their attention to the material being explained by the teacher. One solution that could be applied was the use of interactive learning media to attract the attention of students and make learning activities not only fixated in the classroom because it could be done anywhere.

The learning process must be adapted to the characteristics and psychological development of each learner at each level of education. The effectiveness of learning can be improved if educators are able to create learning media that are suitable for the material and age of the learners (Wardita, I. M., 2021). Children at the SMK level are usually between 16 to 18 years old, where they are at the formal operational stage. This means they have been able to think more abstractly, able to reason, and analyse based on the concrete experiences they have had. The learning period in class X is a transition period from the junior high school level to the early high school level, where based on interviews with teachers, most students experience culture shock and are still confused when learning is only an explanation of the material in class. On the other hand, they start to get excited when learning practice in the computer laboratory. In the learning process, there are still minimal learning resources because most students only focus on textbooks and teachers have not used learning resources or learning media that can be accessed online. Based on initial observation data on students as much as 62.5%stated that they needed learning media to support learning in basic programming subjects.

One solution to the problems encountered in the classroom is the need for the use of appropriate, innovative, and creative interactive learning media to support the process of deliveringmaterial that can increase interest in learning with students simulating previously learned material so that they can optimise the quality of their learning experience (Hasan et al., 2021). Based on the initial questionnaire given, most students said the need for interactive

learning media during learning so that it could be used as a solution to help learning becomemore optimal. Based on the description of the problems above, through the development of web- based learning media assisted by Google sites, it is hoped that it can provide everystudent with a pleasant learning experience through materials and simulations that can be accessed anytime online in Basic Programming subject.

**METHOD**
This study uses Research and Development (R&D) method to make a supporter learning product that can be used in a way independently by the participants. In this research, the product is generated in the form of a website assisted by Google Site for subject Basic Programming for class X TKJ at SMK Negeri 1 Muaro Jambi. This research used Lee and Owen's (2004) development model and Tay Vaughan (2011) evaluation, namely alpha and beta testing for describing level development product when doing the test (Vaughan, 2011). The following chart of development model is used:
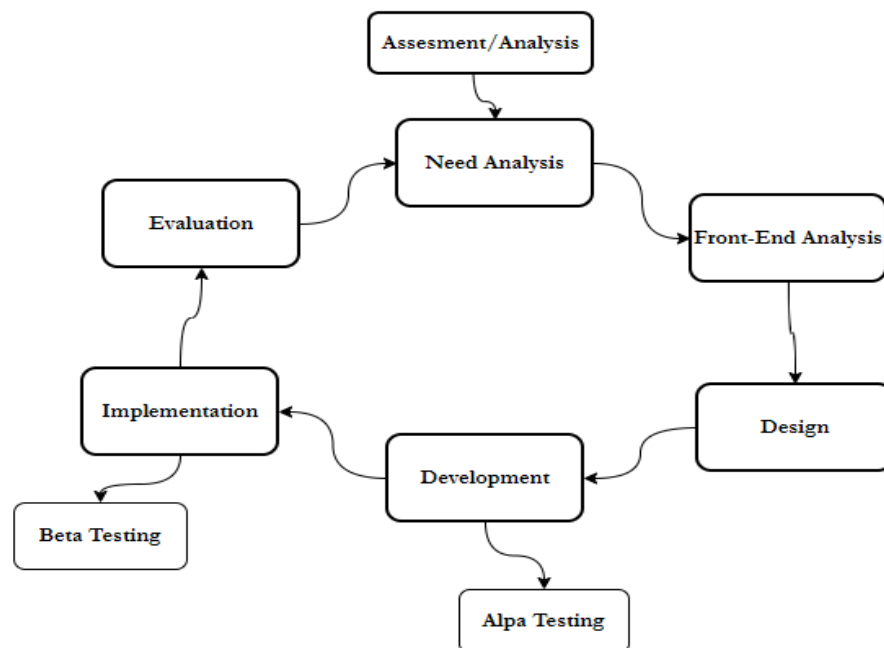


**Image 1.** Development Model of Media Learning

The questionnaires for material experts and media experts used for product validation; questionnaires of subject teachers and students used as tools to determine user responses to media. The questionnaire in this study uses a Likert Scale to assess opinions, attitudes, and views with a rating scale of 1-5 with information: (1) very unsuitable; (2) less suitable; (3) quite good; (4) good; and (5) very good. This research instrument modifies the LORI (Learning Object Review Instrument) version 1.5 by Tracey Leacock, Griff Richards, and John C. Nesbit in 2004 (Leacock et al., 2004). The LORI instrument lattice is used as a reference to make a questionnaire instrument lattice for material experts, media experts, and user trial assessments.

**Table 1.** Grids of Assessment Instruments by Material Experts

| No | Variable | Indicator | Number of Statement Items |
|----|----------|-----------|---------------------------|
| 1 | Content Eligibility | Quality of Content/Material | 3 |
| | | Alignment with learning objectives | 4 |
| | | Feedback and Adaptation | 4 |
| | | Motivation | 4 |

**Table 2.** Grids of Assessment Instruments by Media Experts

| No | Variable | Indicator | Number of Statement Items |
|----|----------|-----------|---------------------------|
| 1 | Media Eligibility | Display Design | 8 |
| | | Interaction Usability | 3 |
| | | Accessibility | 4 |

**Table 3.** Teacher Assessment Instrument Grid

| No | Indicator | Number of Statement Items |
|----|-----------|---------------------------|
| 1 | Display Design | 6 |
| 2 | Quality of Content/ Material | 1 |
| 3 | Accessibility | 2 |
| 4 | Objective Learning | 2 |
| 5 | Interaction Usability | 2 |
| 6 | Bait Flip and Adapt | 1 |
| 7 | Motivation | 1 |

**Table 4.** Lattice of Test Instruments to Learners

| No | Indicator | Number of Statement Items |
|----|-----------|---------------------------|
| 1 | Media Display | 3 |
| 2 | Material | 3 |
| 3 | Accessibility | 3 |
| 4 | Objective Learning | 1 |
| 5 | Interaction Usability | 2 |
| 6 | Bait Come back | 1 |
| 7 | Motivation | 2 |

In determining the criteria for the average value, the researchers look for a range of values calculated using the following formula:

$$\text{Value Range} = \frac{\text{Number of questions x Max Score} - \text{Number of questions x Min Score}}{\text{Total Score}}$$

$$\frac{(15\times5)-(15\times1)}{5}$$

$$=\frac{75-15}{5}=\frac{60}{5}=12$$

So the distance between the values is 12. After calculating, the results are obtained in the following table.

**Table 5.** Criteria for Average Expert Scores

| Criteria | Score |
|---|---|
| Very good | 63 – 75 |
| Good | 50 – 62 |
| Enough | 38 – 49 |
| Not suitable | 26 – 37 |
| Very inappropriate | 15 – 25 |

The scores from the questionnaire are then converted into percentages using the following formula:

$$\text{Validity Value} = \frac{\text{Answers x Value of each option}}{n \text{ x Total highest score}} \times 100\%$$

Then, for the purposes of making a decision regarding whether or not this development product is appropriate, the decision making criteria as in the following table are used:

**Table 6.** Decision Making Criteria

| Percentage of Achievement | Qualification | Information |
|---|---|---|
| 81%-100% | Very Worth It | No Revision Required |
| 61%-80% | Worthy | Needs Minor Revision |
| 51%-60% | Not Worth It | Requires Considerable Revision |
| <50% | Totally Not Worth It | Needs to be repeated |

## RESULTS AND DISCUSSION
### Assessment/Analysis Stage
The analysis stage is carried out to understand, analyse, and interpret the information or data obtained. Lee & Owens conducted two analyses namely: needs analysis carried out on students who studied array material or students in class (Wulandari & Hustarna, 2020) and front-end analysis consisting of user analysis by analysing the users of the product to be developed, namely students in class X TKJ 3 at SMK Negeri 1 Muaro Jambi , analysis technology, conducted by utilising the features contained in the google site application to create interesting media and to support simulation activities using simulator technology features from the OneComplier website which is only integrated with the google site that will be created, situation analysis, conducted by analysing the school situation and facilities that support the learning process and media analysis, done by making conclusions from various previous analyses to become a reference for the media that will be created.

**Design Stage**

At this design stage the developers produce 3 products, namely flowcharts, academic manuscripts, and storyboards. The following is a flowchart for Google site product development in array material:



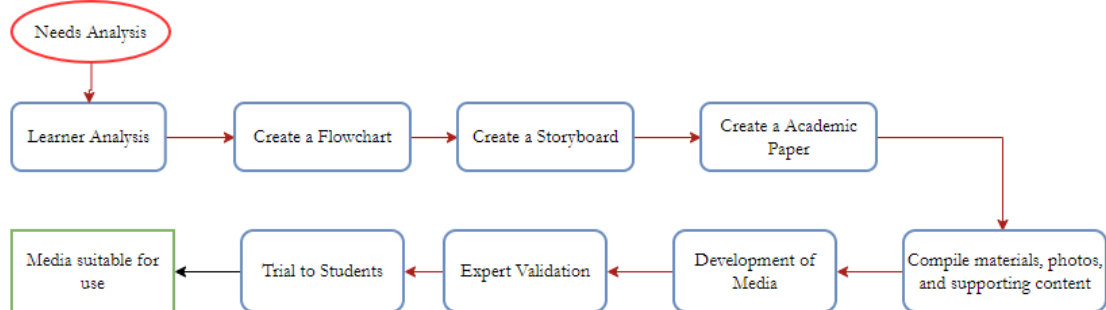**Image 2.** Google Site Product Development Flowchart on Array Material

Next is the storyboard design to sketch full sentences as a planning tool. Storyboards incorporate tools narrative and visualisation on a piece of paper so that the script and visuals are coordinated (Khulsum et al., 2018). The storyboards that have been created for the purposes of developing this learning media are as follows:
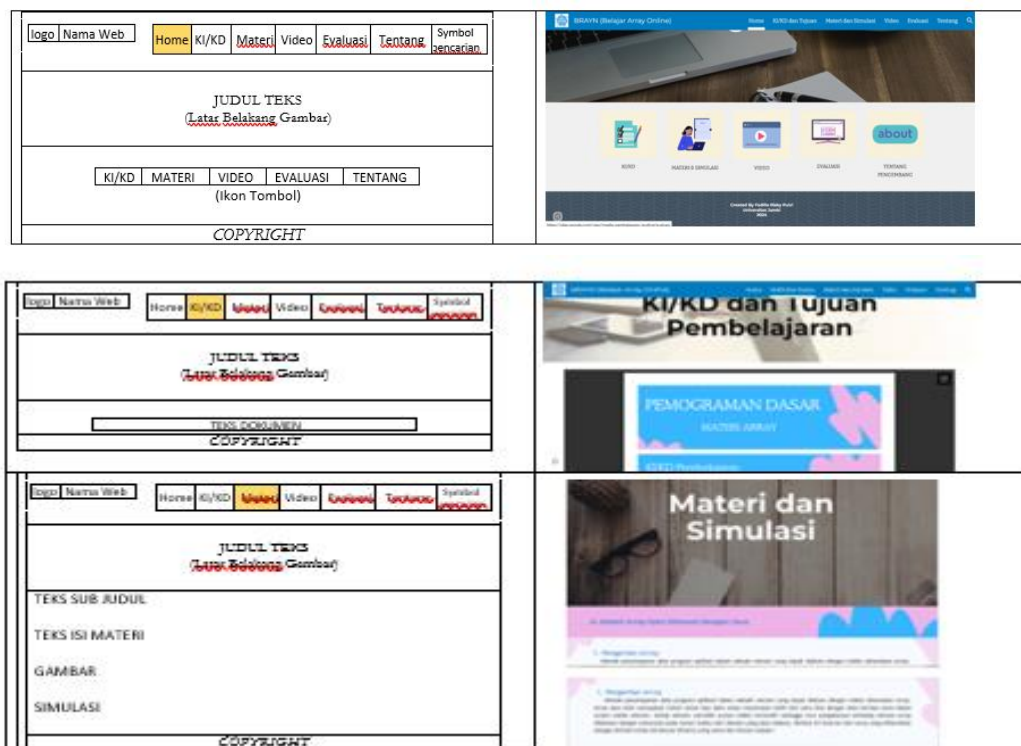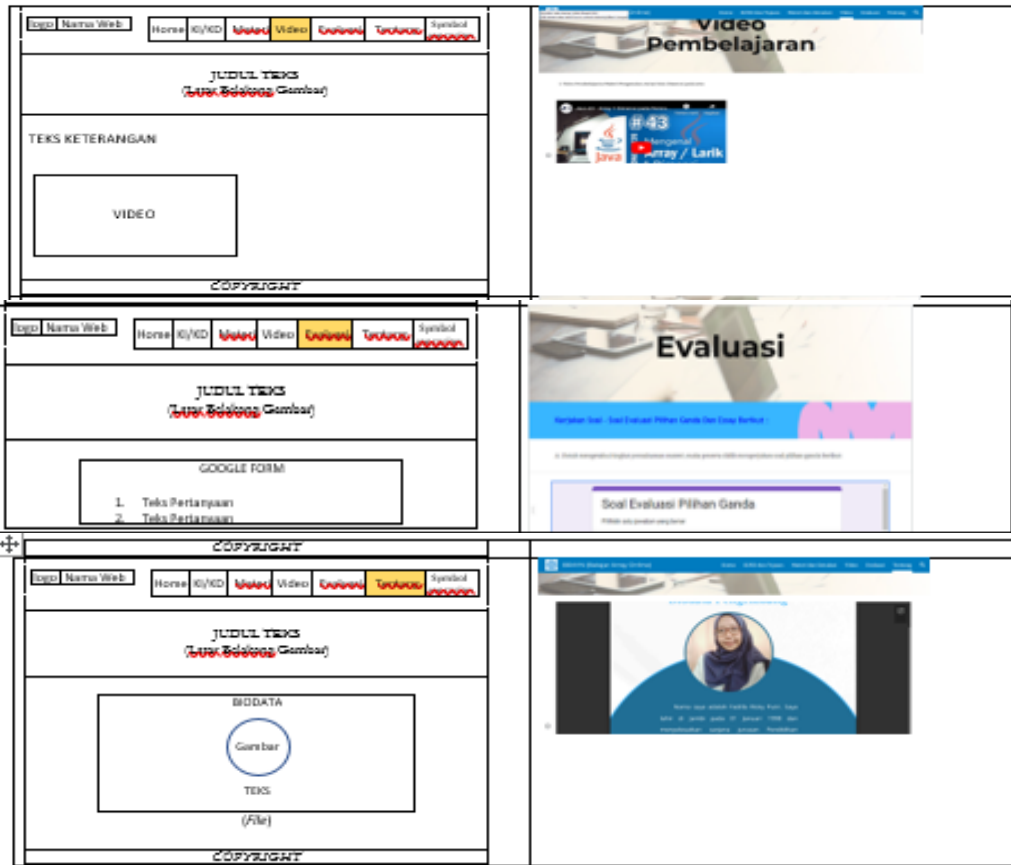
**Image 3**. Storyboard Media Google Site on Array Material

**Development Stage**

The results of the development of learning media can be seen by accessing the link below: https://sites.google.com/view/media-pembelajaran-brayn/home

The media that has been developed is then validated by carrying out alpha testing. Assessment by multimedia experts and material experts is categorised as alpha testing. According to Vaughan (2011), alpha testing in the context of learning media is an evaluation carried out by the design team and development team. The multimedia expert for developing this learning media is Mr. Eko Supriadi, S.Pd, MT, he is a lecturer at ATI Padang Polytechnic. The results of the multimedia expert assessment are as follows:

**Table 7.** Multimedia Expert Assessment Results

| No. | STATEMENT | CRITERIA | |
|-----|-----------|----------|----|
| | | Score | % |
| | **Display Design** | | |
| 1 | Learning media design is interesting | 5 | 100 |
| 2 | Size letter is appropriate and easy to read | 4 | 80 |
| 3 | Colour and type letter are suitable and acceptable | 4 | 80 |
| 4 | The design is neat | 4 | 80 |
| 5 | Design is free from irrelevant or background | 4 | 80 |
| 6 | The existence of material videos helps to clarify the material | 5 | 100 |

| No. | STATEMENT | Score | % |
|-----|-----------|-------|---|
| 7 | The writing of the material is clear, easy to understand and free from errors. | 4 | 80 |
| 8 | Music and decorative features are aesthetically pleasing and do not distract from learning objectives. | 3 | 60 |
| | **Amount** | **33** | **560** |
| | **Average** | **4.13** | **70** |
| | **Interaction Usability** | | |
| 9 | The complete user interface design informs students how to interact with each display, or there are clear instructions. | 5 | 100 |
| 10 | The presentation display makes searching easier. | 4 | 80 |
| 11 | Navigation is easy, intuitive and free from excessive delays. | 5 | 100 |
| | **Amount** | **14** | **280** |
| | **Average** | **4.67** | **93.3** |
| | **Accessibility** | | |
| 12 | The use of media makes it easier to simulate learning material | 4 | 80 |
| 13 | Learning media can be accessed properly via devices, tablets, laptops or computers connected to the internet | 4 | 80 |
| 14 | Learning media is reviewed better to accommodate the limited learning activities of students who are usually without learning media | 5 | 100 |
| 15 | Easy to access without problems | 5 | 100 |
| | **Amount** | **18** | **360** |
| | **Average** | **4.5** | **90** |
| | **Total** | **65** | **1200** |
| | **Average** | **4.43** | **80** |

**General Comments and Suggestions:**
Evaluation section for Google Forms, you can add a header to look more interesting

The assessment results in the table above reveal that this learning media reaches very good standards in terms of design, reusability, accessibility as indicated by the total score obtained, namely 65. With a percentage of 80%. Learning media is considered appropriate with the need for minor revisions according to the advice of multimedia experts.

The material expert for developing this learning media is Mr. Hely Kurniawan, S.Kom, M.Si, who is in the Jambi Province BTIKP DISDIK Team. The results of the multimedia expert assessment are in table 8 below:

**Table 8.** Material Expert Assessment Results

| No. | STATEMENT | CRITERIA | |
|-----|-----------|-------|---|
| | | Score | % |
| | **Quality Content** | | |
| 1 | Material presented is correct | 4 | 80 |
| 2 | Content presented is suitable | 5 | 100 |
| 3 | The simulation features in learning media are suitable for use in learning | 5 | 100 |
| | **Amount** | **14** | **280** |
| | **Average** | **4.67** | **93.3** |
| | **Alignment of Learning Goals** | | |

| | | | |
|---|---|---|---|
| 4 | Learning objectives are complete and correct | 5 | 100 |
| 5 | The learning objectives are in accordance with the student's targets. | 5 | 100 |
| 6 | The learning activities, content, and assessments provided are in accordance with the stated objectives. | 5 | 100 |
| 7 | Learning objects have facilitated students to achieve learning goals. | 5 | 100 |
| | **Amount** | **20** | **400** |
| | **Average** | **5** | **100** |
| | **Feedback and Adaptation** | | |
| 8 | Learning media has the ability to adapt instructional messages or activities according to the needs or characteristics of students | 5 | 100 |
| 9 | Learning media has the ability to simulate or construct the phenomenon being studied in the face of differences in input from students. | 4 | 80 |
| 10 | There is feedback on the actions/responses given by students | 5 | 100 |
| 11 | Able to adapt to the learners' need | 5 | 100 |
| | **Amount** | **19** | **380** |
| | **Average** | **4.75** | **95** |
| | **Motivation** | | |
| 12 | Learning media really motivates students when learning | 5 | 100 |
| 13 | The content is relevant to the personal goals and interests of students | 5 | 100 |
| 14 | Learning media can increase students' interest | 5 | 100 |
| 15 | Instructions are interesting | 5 | 100 |
| | **Amount** | **20** | **400** |
| | **Average** | **5** | **100** |
| | **Amount** | **73** | **1460** |
| | **Average** | **4.86** | **97.08** |

**General Comments and Suggestions:**
The presentation of the material is good, need to add paging (pages) to make it better. The page is not too long at the bottom, just shorten it with paging (pages) and in this simulation segment/section it is necessary to add a compiler reference other than on the web (via browser), can be installed for Windows/Mac depending on the device. In the evaluation section, it is suggested that if possible, there is a live score directly appear on the web page/blog so that students can find out the value and ranking of the learning outcomes.

Table 8. provides data from the assessment results by material experts which shows a total of 73 in the very good category and a percentage figure of 97.08% with a very feasible decision.

**Implementation Stage**
The next step is beta testing, namely trial to user. Learning media users in this matter are teachers and educated participants. The following table shows the results of teacher's response to the media:

**Table 9.** Subject of Teacher Responses

| No. | Rated aspect | Criteria | |
|---|---|---|---|
| | Display Design | Score | % |
| 1 | Learning media design makes it easier for students to learn efficiently | 5 | 100 |
| 2 | The size, colour, and font type of the text are readable | 4 | 80 |
| 3 | The design is neat | 5 | 100 |
| 4 | The existence of material videos helps to clarify the material | 5 | 100 |
| 5 | The writing of the material is clear, easy to understand and free from errors. | 5 | 100 |
| 6 | The colours, music, and decorative features are aesthetically pleasing | 5 | 100 |
| | **Amount** | **29** | **580** |
| | **Average** | **4.83** | **96.67** |
| | **Quality of Material Content** | | |
| **7** | Accuracy of material with KI/KD in basic programming subjects | 5 | 100 |
| | **Amount** | **5** | **100** |
| | **Average** | **5** | **100** |
| | **Harmony Learning objectives** | | |
| 8 | Suitability of content material to learning objectives | 5 | 100 |
| 9 | Suitability of content material to learning activities | 4 | 80 |
| | **Amount** | **9** | **180** |
| | **Average** | **4.5** | **90** |
| | **Interaction Usability** | | |
| 10 | There are clear instructions | 4 | 80 |
| 11 | Ease of navigation in learning media | 5 | 100 |
| | **Amount** | **9** | **180** |
| | **Average** | **4.5** | **90** |
| | **Accessibility** | | |
| 12 | Learning media can be accessed properly via devices, tablets, laptops or computers connected to the internet | 5 | 100 |
| 13 | The use of media makes it easier to simulate learning material | 5 | 100 |
| | **Amount** | **10** | **200** |
| | **Average** | **5** | **100** |
| | **Feedback and Adaptation** | | |
| 14 | Adaptation or feedback content is possibly run by different students or student models | 5 | 100 |
| | **Amount** | **5** | **100** |
| | **Average** | **5** | **100** |
| | **Motivation** | | |
| 15 | Learning media is able to motivate and attract students' attention | 5 | 100 |
| | **Amount** | **5** | **100** |
| | **Average** | **5** | **100** |
| | **Total** | **72** | **1440** |
| | **Average** | **4.8** | **96** |

**Comments and Suggestions:**
The media is necessary for learning and improving learning motivation.

Table 9 shows percentage 96%, so it can categorised as worthy to be used as a learning medium. Once it is done, it gets validation from the subject teacher by testing it to educated participant. The test involves 57 respondents from 2 different classes. As for the test results,

data for class X TKJ 1 students is contained in appendix 11. For the next class, the learning media is tested on a class basis. Based on data obtained from class X TKJ 1 and 2 students, both classes show a figure of 89%, namely the very decent assessment category. The results of the participants' responses concluded that the Google Site learning media in this array material can be used for learning.

**Evaluation Stage**
The evaluation stage is carried out to assess how good and efficient the media has been created, as well as to provide recommendations for improvement quality from media products that have been made.

**Media Attraction**
There are several attractions in the created learning media, namely research and development. It has passed a number of stages from the analysis process of initial, planning, design, development, and validation testing expert, field test, so then produce ideal research and development product. Instructional Media with the help of this Google site called BRAYN is accountable. It is an original and different website from any other websites, where students can study from available materials and videos as well as practice programming on one site. This tutorial video is easily operated and accessed on a variety of devices and systems operations connected to the internet, so it is more flexible to be used in during the learning process in the classroom or in an independent way.

**CONCLUSION**
When planning Google media site for array material, it is important to consider the level of understanding and learning styles of students, and provide content that suits their needs. The use of Google site facilitates developers with creative flexibility to design layout and content according to learning needs. Developers can include text, images, videos, graphics and other interactive elements to enrich the learning experience (Tambunan & Siagian, 2022). This learning media was developed with the help of the Google Site platform in accordance with the design that has been determined, attaching simulations and evaluations based on Google forms that makes this media interactive. The results of media feasibility test by material experts, media and subject teachers show the category is very good and feasible theoretically and conceptually and suitable for testing on users. The test results try to show students the very good category and conclude that the media is practically feasible. Google site learning media for the basic array programming material is interesting and can motivate students.

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