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Validity test of "Sigeram" as an android-based biology learning interactive media on human movement system topic

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ABSTRACT

This study aims to describe the suitability of "Sigeram" derived from the acronym "sistem gerak manusia" or human movement system to become an android-based interactive learning media for biology subjects. This study uses descriptive research with four stages, namely analysis, design, development, and validation. The data collection technique used a validity questionnaire. The validity test subjects consisted of three practitioners, including a teacher from Senior Hugh School 12 Banjarmasin and two lecturers from the study program of Biology Education, Universitas Lambung Mangkurat. "Sigeram" application consists of some menus, including learning prerequisites, identity, learning implementation components, meeting schedule, concept map, then the material section, summary, glossary, quiz, bibliography, and profile. Additional features in the interactive media are the "Bio Info", "Let's Find Out", "Let's Discuss", "Act Creatively", "Habituation", "Reflection", and "Final Project". Testing the validity of "Sigeram" as an interactive media for learning Biology based on android showed a validity score of 4.29 with a very valid category, so that "Sigeram" can be used as an interactive media for learning biology, especially in human movement system topic.

INTRODUCTION

Learning in the current era of the industrial revolution 4.0 requires a teacher to use technology to improve learning outcomes and facilitate the learning process of students (Oke & Fernandes, 2020). The development and sophistication of technology, including those related to learning, will certainly affect the world of education (Szymkowiak et al., 2021). Media is one of the main aspects of learning (Churiyah et al., 2020). That's one of the important elements in the learning process is learning media, because it contains messages and information about learning, so that proper media development will help the teaching and learning process.

One of the media for learning by utilizing technology is the definition of learning media in education in the 21st century (Al Kandari & Al Qattan, 2020). Currently, education uses information and communication technology as a source and learning media to gain knowledge that is relatively cheap and has a very wide reach. An example of the development of technology that is very widely used in various groups are smartphones with the android operating system (Qohar & Wahyuningsih, 2021). One of the utilization of android in learning is the use of media that is popular in the current digital era, namely in the form of multimedia which according to Guan et al. (2018) is the simultaneous use of various types of media, such as images, videos, text and so on, where all of these media become one in order to achieve predetermined learning objectives. Interactive learning media is multimedia that can be used in learning. Interactive learning media include not only video, sound, animation, images and text, but also a controlled device that can then be used by users as desired.

The type of smartphone used by students based on the results of their needs analysis, resulted in a percentage of 98% in the form of android smartphone users. The use of smartphones among students is often used to play social media and play games with a percentage of 63.2%. However, the time of internet usage in learning is <1 hour. This indicates that students use smartphones more often outside of learning. According to Qodr et al. (2021) that the utilization of smartphones by students is not optimal, because it is only used to play social media and play games, while learning applications are still very rarely used. This matter is the basis for researchers to develop interactive learning media by utilizing technology so that students can learn effectively and efficiently. Users can add various elements in utilizing iSpring application, examples of elements that can be added are "interaction" elements, text, audio, animation, images, videos, links, and interactive quizzes. Presentation files can be converted into APK (application) format from the original HTML format in iSpring Suite 10 by using the APK builder website, which can later be used and installed on android (Handayani & Rahayu, 2020).

The learning material developed in this android application is human movement system topic. Based on the results of the analysis of the needs of students as much as 44.9% answered by the material of the movement system including difficult material. This percentage is the highest compared to the selection of other materials in 11th grade odd semester. Students revealed that the movement system material was difficult due to the broad scope of the material, and there were difficult terms. Movement system material is considered difficult to learn, because there are many bone names with Latin or foreign terms that must be memorized (Syamsurizal et al., 2021). Not only that, the movement system is also considered difficult because some of the constituent bones are difficult to distinguish if you only look at the pictures in the book. The results of the analysis of the needs of students at Senior High School 12 Banjarmasin also show that 89.8% of students need media for interactive learning about human movement system material based on android applications.

Previously, research on learning media developed based on applications has been carried out, but there are differences in the concept that interactive learning media in the form of an android packaging kit (APK) have high validity so that it is feasible to use (Qohar & Wahyuningsih, 2021). Research on interactive learning media based on android is also very feasible to be used as a learning media (Handayani & Rahayu, 2020). Based on this explanation, researchers have an

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interest in conducting research to develop interactive media on android-based human movement system material under the name "Sigeram". The name "Sigeram" comes from the acronym of the biological material itself, namely "sistem gerak manusia" or human movement system. The purpose of this research is to describe the suitability of "Sigeram" to be an effective learning media in biological subjects with android-based on human movement system topic.

METHODS

This research is a descriptive study that explains the development of interactive media on android-based human movement system material under the name "Sigeram". The research was conducted at Senior High School 12 Banjarmasin with the address at Street of Alalak Utara, North Banjarmasin District, South Kalimantan. The class used is 11th grade Science class in the 2022/2023 school year. The research time was held in July-December 2022. The student sample used was 30 students consisting of two 11th grade Science classes. The research stages carried out consisted of four stages, namely introduction, design, development, and validity. In the introduction stage, the definition of the interactive media used was carried out. At the design stage, the learning media were designed using iSpring Suite 10 with android-based. At the development stage, there were three practitioner subjects who were partner teachers at Senior High School 12 Banjarmasin and two lecturers from Biology Education Study Program Universitas Lambung Mangkurat. At this stage, a valid test is carried out which aims to describe the objectivity and suitability of the interactive media content developed with learning objectives. The suitability assessment consists of 7 aspect items with 25 sub-aspect items with a score range of 1 to 5 regarding learning objectives, content, examples, language, format, presentation, and the author's ability.

Making learning media based on android applications uses iSpring Suite 10 which integrates with Microsoft PowerPoint. According to Umam & Sulaikho (2021). iSpring tools are very easy to use. The device is combined using Microsoft PowerPoint, where the operating system is easier because special skills in programming are not needed. HTML5 is the media format generated by the iSpring Suite application. Then to convert the media format in the form of HTML5 into an APK file, you can use supporting software such as the Website 2 APK Builder so that it can be installed on a smartphone that has an android operating system. Analyze the results of validity and feasibility using the formula equation (Irfan et al., 2023).

$$M = \frac{\Sigma X}{N}$$

Description:
M = Average score of each aspect
ΣX = Number of scores obtained
N = Number of aspects

The validity results can be matched with the criteria in Table 1 below:

Tabel 1. Criteria for validity and feasibility of interactive learning media

Score Average	Qualitative Category
X > 4,20	Very valid, can be used without revision
3,40 < X < 4,20	Valid, can be used with little revision
2,60 < X < 3,40	Sufficiently valid, can be used with lots of revision
1,80 < X < 2,60	Less valid, can't be used
X < 1,80	Not valid, can't be used

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RESULTS AND DISCUSSION

The development of interactive learning media on human movement system topic based on this android application is in the form of multimedia which combine the use of text, images, animations, videos, thus making learning more interesting. Aldalalah (2021) revealed that visualization in the form of images, text and videos can make it easier for students to understand and remember the topic presented. Hamutoglu et al. (2020) also stated that the addition of images makes the media much more interesting, so that it can strengthen memory, facilitate understanding and provide real experiences for students.

The format of interactive learning media on movement system topic based on android consists of the main menu, namely instructions for use which contains general instructions and instructions for using buttons/navigation, introductory learning which contains learning prerequisites, identity, learning implementation components, meeting schedule and concept map, then the material section, summary, glossary, quiz, bibliography, and profile. Additional features in the interactive media are to the "Bio Info" element which is equipped with links to articles that can be accessed by students to broaden their horizons, and the various questions that can stimulate students to think with the "Let's Find Out" element. There are also other components such as "Let's Discuss," "Act Creatively", "Habituation" and "Reflection" components to motivate students and "Final Project" to train students' creativity. There are interactive quizzes that vary in form such as true or false, matching and multiple-choice questions shown in Table 2.

Table 2. Recapitulation of the results of the android application-based interactive learning media validity test

No.	Aspect	Score			Average
		Validator 1	Validator 2	Validator 3	
A. Learning Objectives					
1	Relevance of learning objectives	5	5	5	5,00
2	Meaningful learning objectives for teachers	4	4	5	4,33
3	Meaningful learning objectives for learners	5	5	5	5,00
4	The source of the derived learning objectives is clear	4	4	5	4,33
5	Learning objectives are in accordance with students' characteristics	4	4	4	4,00
	Average				**4,53**
B. Content					
6	Relevance of media content in accordance with learning objectives	4	4	5	4,33
7	Theoretical content is presented fully	4	4	4	4,00
8	Definitions and explanations are presented in complete	4	4	4	4,00
9	The use of terms, techniques, formulas, and symbols is presented in full	4	5	5	4,67
	Average				**4,25**
C. Examples					
10	Examples are presented on the learning media	4	5	4	4,33

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No.	Aspect	Score			Average
		Validator 1	Validator 2	Validator 3	
11	The examples presented are original, up-to-date, and relevant to everyday life	4	5	4	4,33
	Average				**4,33**
D. Language					
12	Learning media uses appropriate sentence structure	4	4	4	4,00
13	Sentence effectiveness in learning media	4	4	4	4,00
14	Learning media uses standardized words	4	5	4	4,33
15	The language in the learning media is in accordance with the cognitive development level of students	4	4	4	4,00
16	Sentences used in learning media are in accordance with PUEBI (https://puebi.js.org/)	5	4	4	4,33
	Average				**4,13**
E. Format					
17	The concept of human movement system in learning media is presented coherently	4	5	5	4,67
18	Completeness of learning media section format	4	4	5	4,33
19	The learning media is equipped with introduction, instructions for use, concept map, evaluation questions and developer profile	4	5	5	4,67
	Average				**4,56**
F. Media					
20	Layout elements of learning media	4	4	4	4,00
21	Discourse, images, and videos on learning media	4	4	5	4,33
22	The appearance (cover) of the learning media is appropriate and harmonious	4	4	5	4,33
23	Accuracy of learning media color selection	4	4	4	4,00
24	Accuracy of learning media type setting elements	4	4	4	4,00
	Average				**4,13**
G. Writer ability					
25	The author's ability to develop learning media	4	4	4	4,00
Total Score		**103**	**108**	**111**	**107,31**
Average Score		**4,12**	**4,32**	**4,44**	**4,29**
Validity Score			**4,29**		
Criteria			**Very valid**		

The results of the validity of learning media were obtained through the assessment of three practitioners who were one teacher of Senior High School 12 Banjarmasin and two lecturers from the Biology Education Study Program, Universitas Lambung Mangkurat. Based on the assessment

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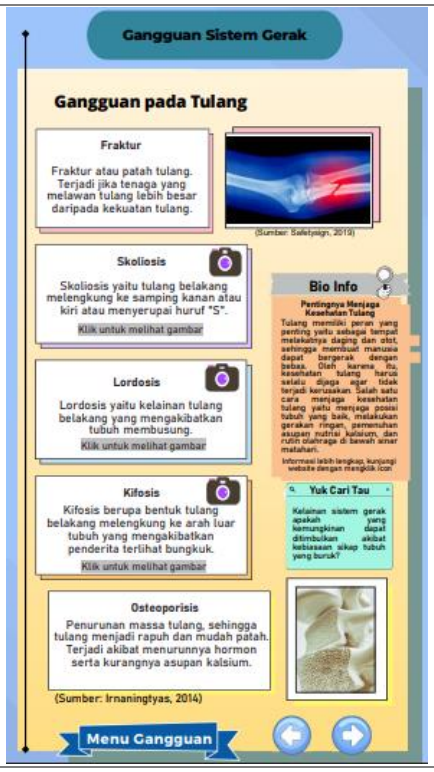
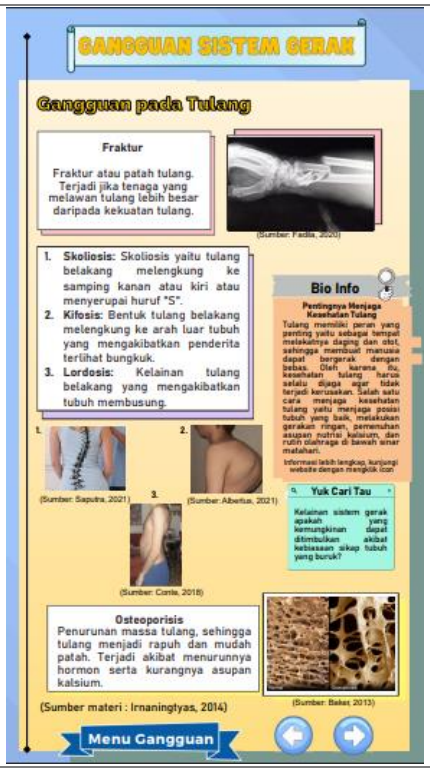
from three practitioners, the average validity score was 4.29, which was categorized as "very valid". This shows that the "Sigeram" media are valid for the demands of everyday life, in learning and curriculum. Some examples of product revisions can be seen in Table 3. The suggestions and input provided by the experts include: (1) improve the learning outcomes by adding appropriate operational verbs; (2) add basic competency 1.5 and 2.5 from Biology curriculum; (3) use real sample images; (4) adjust the selected image again with the topic being explained; (5) improve the concept map by removing inappropriate images; and (6) adapt the summary to the formulated learning objectives.

Tabel 3. Example of product revision based on expert feedback

No.	Feedback	Before revision	After revision
1	Improve the quality of "Sigeram" visual		

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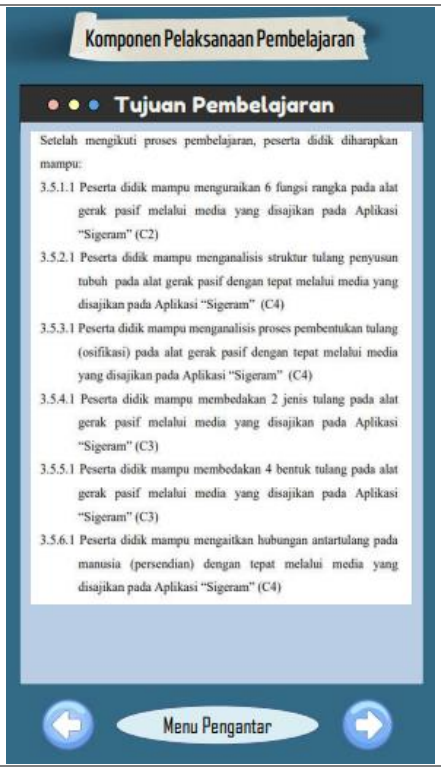
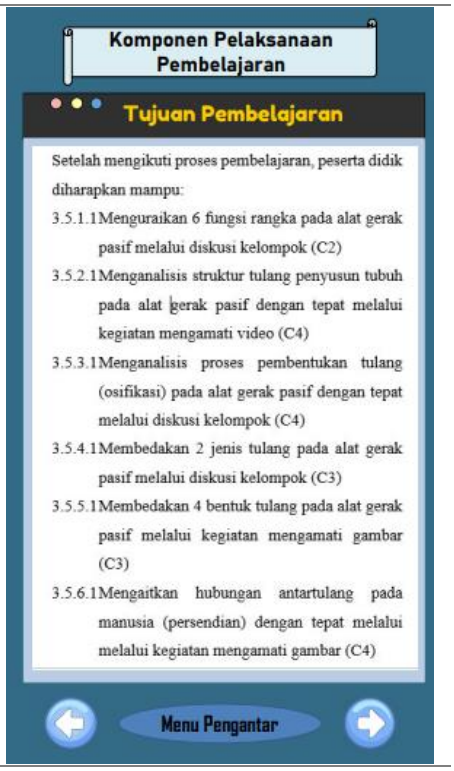
No.	Feedback	Before revision	After revision
2	Formulation of the learning objectives with suitable operational verbs		

Based on the results of the validity test recapitulation, the learning objective aspect obtained an average score of 4.53, indicating the "very valid" category. According to Ilyashenko et al. (2019) that the suitability of the topic provided is appropriate for indicators of competency achievement, basic competencies and learning objectives which guarantee the achievement of the desired learning outcomes, as well as the opposite, if the composition of the topic is not in accordance with these three things, then the achievement of learning outcomes will not be optimal. The media developed is required to be in accordance with learning objectives and materials, for example the relevance of learning objectives to the curriculum (competencies standard and basic competencies) (Puspitarini & Hanif, 2019).

The next aspect is the content aspect with an average score of 4.25 where the category is "very valid". In essence, teaching material is the content of the subjects conveyed by educators to students in accordance with the curriculum currently used, then teaching materials are required to be able to support and be appropriate for the achievement of learning objectives (Arani, 2017). Learning media can be effectively delivered if it contains clear content and is given valid images (Febrianto et al., 2020), so that the suitability of the information and the completeness of the images that have been presented can be well received by students and not monotonous (Rahmawati et al., 2021).

In the aspect of the examples, the average score is 4.33, which means that examples are presented in the learning media, and the examples are appropriate in everyday life. This matter is related to contextual learning as expressed by Morris (2021), namely the concept of learning that emphasizes the relationship between the real world of students' lives and learning materials. Using this matter of the problem is hoped that students can apply and connect the competencies of their learning outcomes with their daily lives (Dewi & Primayana, 2019). Examples will provide a concrete depiction of a concept, so that with these examples, the description of the topic will make students clearer and easier to understand and can help students to understand a concept (Mandasari et al., 2021). The use of images and videos is a form of visual representation needed in learning Biology (Jung et al., 2019).

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Based on the linguistic aspects, the average score is 4.13 with the category "appropriate". Things that need attention are the use of sentence structure, sentence effectiveness, and conformity with PUEBI. According to Nurwicaksono & Amelia (2018), many language errors occur due to improper use of punctuation marks, And the use of redundant spaces and the use of the strip sign (-), as well as from aspects of word writing such as improper writing of affixes, rephrases, and prepositions. In this aspect, it is still in the appropriate category and improvements are made according to the necessary suggestions and input. Brysbaert (2019) adds that readers can gain maximum comfort in reading when the typography chosen is appropriate.

The next aspect is the format aspect with an average score of 4.56 where the category is "very valid". The application is equipped with a summary, glossary, bibliography, so that this media can be used easily by students. On the basis of the assessment results from the media aspect, the average score is 4.13 with the category "appropriate." Aspects that have not received the maximum score, namely on the elements of learning media layout, color selection, and the accuracy of the typesetting elements. In this aspect, improvements are made according to the suggestions and input needed. Mukti & Nurcahyo (2017) revealed that the placement of elements of a learning resource will greatly affect the information message displayed. This is supported that color selection determines physical and psychological attractiveness, making it easier to convey understanding, unification and emphasis on the content to be highlighted (Azmuddin et al., 2020).

The media with this android has its advantages, namely that it can be used independently both outside and inside the school and the display design is very attractive starting from the image, animation, color and writing. The use of android as a learning medium is flexible, because it can be used outside or inside the classroom (Wijaya et al., 2021). Learning media based on android applications have the benefit of attracting students' attention when the learning process takes place (Mustadi et al., 2022), increasing pleasure and providing a new passion for learning (Ayun et al., 2022), so that students' motivation and interest in learning can grow.

CONCLUSION

The average validity score obtained from the android-based "Sigeram" learning media is 4.29 where the category is very valid. The "Sigeram" media developed is valid for use as a biological learning media, and it is hoped that the utilization of android-based applications in human movement system topic can be an alternative for biology teaching and learning in digital era.

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