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THE FEASIBILITY DEVELOPMENT OF ANDROID-BASED APPLICATION MEDIA (SKELETONPEDIA) IN BIOLOGICAL LEARNING ON SKELETAL SYSTEMS SUBMATERIAL OF SENIOR HIGH SCHOOL IN XI GRADE

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Abstract

Existence of learning media is the facilitates of the learning process for fulfilled the needs for rapid information in the teaching and learning process between student and teacher. Android-based media application are one of the alternative media learning that can be used in the learnt of the skeletal system. The aims of the research was to produce Skeletonpedia as an android-based media application that were practice and valid. This study used the ASSURE development model with 20 students at the second grade of senior high school at SMAN 1 Gedangan. The research instruments were media validation sheets, observation of student activities sheets and student questionnaire response sheets. The results of this study got 3.86 scores with a very valid category of the validity Skeletonpedia as an android-based media application. The practicality of the media got a very practical category based on the use of media by 100% score and student responses by 91.3% score. Based on the researched of the the feasibility in android-based application media of Skeletonpedia on skeletal system submaterial had been proved it as a valid and practical learning media.

Keywords: Learning media, android-based media application, skeletal system.

INTRODUCTION

Changes from the development of the education are also in contact with the development of information technology in the form of gadgets or smartphones with the average user from adolescence to adulthood. Users of gadgets or smartphones with the android operating system are widely used by the age range of 13 to 24 years have been reached 44% of users (Mubarok, 2015). The used of smartphones in the field of education were one alternative device developed as a learnt medium known as m-learning technology. M-learning makes it easy for students to access learning material and information that is not limited in space and time, so students can met their information needs formally and informally (Mulyani, 2018).

Learning media as the delivered of messages and clear information also can increased and directed the attention of students, explained by Arsyad (2012). Learning media is a tool that have functions in conveyed learning messages and can be used as an additional source of information or as an alternative learning source to met the additional information desired by students if it's not found in books or learning resources that have been used at school (Yektyastuti & Ikhsan, 2016).

The feasibility development of android-based application media (Skeletonpedia) measured by validity and practicality test. Media validation is needed as an assessment that is used to determine the feasibility of an android-based skeletonpedia application developed based on media criteria as well as material suitability, presentation and language. The feasibility of learning media for students need to be tested used by media validation sheet from the experts both from media and material aspects. The criteria for media selection that can be approved are reviewed from 2 criteria, practicality which is seen from the user's familiarity with the type of media used and the assessment of space and time used by media, technical feasibility known as the validity accorded to the quality of the media that can support the learning process of the students (Mahnun, 2012). Learning media must be practically can be used well by students because another criteria of the validity and practicality in learning media were the suitability of the media with the objectives, the right used, the condition of students, the availability of media, practical and durable, also as well as teacher skills are needed (Musfiqon, 2012).

Elissavet and Economides (2014) has several feasibility points android-based learning media according to must be completed, namely in terms of

their use, the text of the application must be consistent and proportionated, graphics in accordance with the background and there are animations that supported the delivered of material. Media based on its use can be used in various branches of science accorded to the characteristics of each science because the media has an important enough position in teaching and learning activities (Hidayati, 2013). Learning media in its used contained an introductory stimulus that contained elements of message design for students in processed an information and stored it in long-term working memory. The stages in processed an information in working memory focus on how new knowledge is modified and influenced by the interpretation of stimulus from message design elements such as size, illustration, text, animation, narration, color, music, and video (Pranata, 2004).

Cognitive development in students affected the ability to processed information in students, where at the high school stage is at the formal operational stage. The formal operational stage is the capacity of students to used hypotheses and the capacity to used abstract principles that can be used as a basis for developed learning media with physiological aspects of biological material that cannot be directly observed (Noviar, 2016). One branch of science that has abstract concepts involved processes that are quite difficult to observed directly and is complex were biology (Taufiqoh, et al., 2012).

One of the 2013 curriculum basic competencies on biology for high school XI grade number 3.6 contains an analysis of the relationship between the structure of organ building blocks in the motion system in relation to bioprocess and functional disorders that occur in the human motion system. The sub-material on the material of the motion system that is, the skeletal system accorded to researched by Murdiyani (2012) was one of the material that has its own difficulties for high school XI grade students to be understood in scientific terms and the processed of bone formation also the bone disorders. The difficulties experienced by these students accorded to Wijaya (2013) due to lack of visualization of real objects from the material presented. Visualization in sub-material of skeletal system is needed for built user perceptions and interactions with the real world that were packaged in the form of 3D objects in real time (Hidayat, 2015).

Application according to this term was a software program that is ready to be used and arranged to carry out a function in helped its users or other applications that can be used by the intended target. Application also be interpreted as the concept of a subject in a computer program created to assist humans in carried out certain tasks (Nurcahyono, 2012). Android-based application was an operating system software that included an middleware, and key applications which was popular smartphone platform (Gandhewar, et al., 2010). The existance of android had been increased populer was evidenced from the several research companies that has named android as a champion of smartphones than the other platforms, such as Symbian and AppleiOS (Mulyana, 2012).

Android-based application media have its featured presented to help the student in learning process. Based on the theories and problems that have been outlined by reserchers, the researcher developed an android-based learning media in the form of a feasible media that known as Skeletonpedia application in learning biology on the skeletal system sub-material for 11 grade.

METHODS

The research conducted was a type of development research with the ASSURE model including analyze learners, state objectives, select methods, media, and materials, utilize media and materials, require learner participation, evaluate and revise (Smaldino, et al. 2008). Media development was carried out in September 2018 until August 2019 at SMAN 1 Gedangan and the Department of Biology, UNESA. The trial of media then was carried out at SMAN 1 Gedangan. The target in this study was an android-based skeletonpedia application media on the sub-material of skeletal system that were tested on 20 high school students of XI grade science.

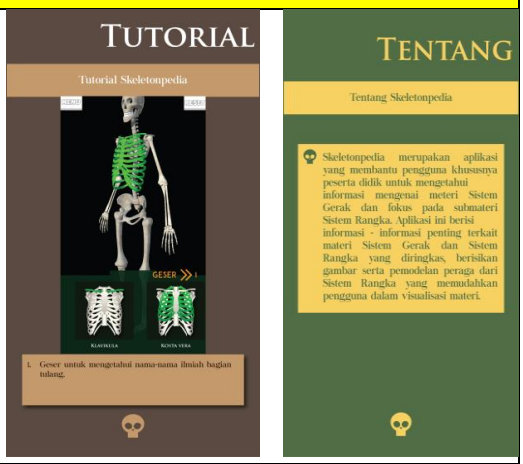
Media validity was measured based on the results of the validation carried out by four experts. Validation activities carried out to determine the validity of the developed media. The practicality of the media was obtained through the observations by three observers of student activities in the classroom. Practicality was also measured based on the results of student responses to the skeletonpedia application media developed. The instrument used to determine the feasibility of the media was a validation sheet filled out by reviewers which included material expert lecturers, media and IT experts and Biology teachers. The media was categorized valid if the average score obtained ≥ 2,5 by the Likert scale (Riduwan, 2012). The instrument used to determine the practicality of the media was the sheet of activities and student responses. The developed media was categorized as practice if the average score obtained by ≥ 70% fot the student responses and ≥ 61%

for the student activities used the Guttman scale (Riduwan, 2012).

RESULTS AND DISCUSSION

The result of this research was the development of an android-based skeletonpedia application in 11 grade sub-material of skeletal system that were feasible based on the validity and practicality. The features contained in the Skeletonpedia an android-based application media consist of prototypes of human skeletons arranged in 3D and could be rotated 360 degrees in all directions and equipped with the scientific names of bones. The skeletonpedia application menu consists of several menus, namely, "about" menu, tutorials, competency standards, materials and quizzes that supported the used and fulfillment of skeletal system information. The results of the Skeletonpedia application development media based on android could be downloaded for free on the google play store and illustrated in Table 1.

Table 1. The results of the Skeletonpedia application

The Initial Display Features and Skeletonpedia Application Menu	About Features and Tutorials
	
Information: • The human skeleton prototype in 3D, could be rotated 360 degrees was equipped with the scientific names information for each bone accorded by the bone layout. • The initial application menu was on the left side.	**Information :** • The About menu contained the description of the profile and the purpose of the skeletonpedia application media, also the author's information. • Tutorial menu was used as a guided for media uses.
Competency Standards and Quiz Features	
	
Information : • The Competency Standards menu was filled by the basic competency information that used as the material on the Skeletonpedia application media. • Quiz menu as an exercise and evaluation of students related to the material on the application media, equipped with a time limit, music, opportunity to answer (there was a "heart" limitted for answered the right choice) and the score results.	

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Skeletonpedia application media was the development of learning media as measured by four material experts and the technology and information experts to measure the validity of the media. Skeletonpedia application media based on android obtained a score interpretation of 3.86 with a very valid category (Table 2).

Table 2. Validation Results Media Validation Results Skeletonpedia Android-Based Applications To Improve Learning Outcomes on the Sub-System Material Submission in High School / MA Class XI Students.

Rated aspect	Score total	Average
Content Feasibility		
Material suitability	61	3,85
Feasibility of presentation		
The type and size of letters used in application media	43	3,58
Feasibility of presentation		
Graphic quality	47	3,91
Display quality	75	3,75
Fill in the application usage instructions	46	3,83
Average of each component		**3,78**
Feasibility of Language		
Use of language	48	3,00
Language structure	47	3,91
Use of terms	48	3,00
Average of each component		**3,97**
Average of all components		**3,86**
Feasibility category		**Very feasible**

Category Description:
1.00 - 1.75: less valid
1.76 - 2.50: valid enough
2.51 - 3.25: valid
3.26 - 4.00: very valid

Validator Description:
1. Validator 1: Expert Lecture Material 1
2. Validator 2: Expert Lecturer Material 2
3. Validator 3: Expert Lecturer in Media and Information & Technology
4. Validator 4: High School Biology Teacher

Overall validation results got an average score from the experts of 3.86. This average score were included in the very valid category based on the criteria of interpretation of the validation score proposed by Sugiyono (2008). Overall Skeletonpedia application media was categorized as a suitable media for be used in learning process that is supported by the reseached of Arsyad (2012) that learning media functions as a delivery of messages and clear information that can be enhance and direct student attentions related of the validation result by the content feasibility, feasibility of presentation and feasibility of language each component got a very feasible category (Table 2). The validity of the media was also supported by the results of student responses, that as many as 100% of students expressed interested and were motivated to learnt with the Skeletonpedia application media and as many as 90% of students stated that the material presented was easy for students to be understood (Table 3), so that from of the percentage obtained media categories Skeletonpedia application is very practical. Thus, the validity of the Skeletonpedia application media has clear information and does not cause multiple interpretations, and seen from the responses of students also supported to learnt by used Skeletonpedia application media that can motivate and easily understood by students.

The used of a media also influences the initial function of a media itself. Accorded to Pertiwi et al. (2015) using a media can be facilitate students in accepting material that contains summarized concepts, and can be used as reinforcement or repetition of material that have previously been taught with fun. The use of a media could be measured through the practicality of the media based on the results of the used of the media in learning processes and the results of student responses to the media developed. Observation of the implementation of the use of media was done by observed the activities of the students in operate Skeletonpedia application in Table 3 and students responses to the Skeletonpedia application media used the student response questionnaire in table 4.

Table 3. The Implementation Results of Skeletonpedia Application Media Based on Android on Sub-Material Skeletal System to Improve Learning Outcomes for High School / MA XI Class Students.

No	Criteria	Average (%) P1, P2, P3
1.	Students use the Skeletonpedia application and enter the About Skeletonpedia menu	100%

No	Criteria	Average (%) P1, P2, P3
2.	Students read and understand the explanations about the Skeletonpedia application	100%
3.	Students read the instructions for using the Skeletonpedia application	100%
4.	Students use the Skeletonpedia application and observe a 3D human skeleton prototype that can be rotated 360 degrees at the beginning of the application page	100%
5.	Students can operate the bone select feature on 3D human skeletons	100%
6.	Students read information on each bone's scientific name	100%
7.	Students can operate the Skeletonpedia application well	100%
8.	Students read material about the understanding of the Motion System in the Motion Systems menu	100%
9.	Students read material about the understanding of the Skeletal System in the Skeletal Systems menu	100%
10.	Students enter the skeletal system menu and enter the appendicular & axial skeletal section	100%
11.	Students can play videos about the Osification process	100%
12.	Students use the Skeletonpedia application and enter the Quiz menu	100%
13.	Students work on all questions on the Quiz feature	100%
14.	Students are enthusiastic in operating the Skeletonpedia application	100%
15.	Students have no difficulty in operating the Skeletonpedia application	100%
Average of all components		**100%**
Category		**Very Good**

Observer Description:
P1: Observer 1
P2: Observer 2
P3: Observer 3

Category Description:
0– 20 :not good
21 – 40 : good enough
61 – 80 : good
81-100 : very good

The average results of the percentage of implementation filled by the three observers are gain a 100% score with a very practical category means that all media features that have been used in activities have been carried out on 20 students. The data supports the theory of research by Chen et al. (2013) that as many as 67% of students feel the use of gadgets or smartphones can help in academic goals which are also supported by validation results data on one of the assessment criteria, namely the contents of the material that are easily understood by students and the presentation of the design interesting to get a very decent category (Table 2). This is in line with the theory of Pertiwi et al. (2015) that using a media can facilitate students in accepting material that contains summarized concepts, and can be used as reinforcement or repetition of material that has previously been taught with fun. The practicality of Skeletonpedia application media apart from the aspects of implementation, also obtained from the results of student responses in the form of a questionnaire that aims to determine the practicality and obstacles experienced by students as research subjects in research development Skeletonpedia application media, the following results of student responses in Table 4.

Table 4. The results of student responses to the skeletonpedia application media based on android on the sub-material of skeletal system for XI grade.

Criteria	Average percentage of each aspect (%) and category
Appearance of Skeletonpedia Media Graphic Application	93,3% (Very Practical)
Operation	95% (Very Practical)
Attraction	90% (Very Practical)
Materials	95% (Very Practical)
3D Skeletal prototype	90% (Very Practical)
Quiz Menu	85% (Practical)
Category and Average	**91,3% (Very Practical)**

Category Description :
≤ 35 : Not practical
36,0 – 51,0 : Less practical
70,0 – 85,0 : Practical
52,0 – 69,0 : Practical enough
86,0 – 100,0 : Very practical

The results of student responses got a score recapitulation of 91.3% with a very practical category (table 4) which was directly proportional to the

observation activities of the application media which got a very practical category with a score recapitulation of 100%. Thus, the used of the skeletonpedia application has proven to be practical and could be used well by students. An android-based learning media could be used as a source of additional information if the sought information was not found in books or other learning resources at school (Yektyastuti & Ikhsan, 2016). The theory supports one aspect of the student response outcomes, namely media interest which states students were interested in participated in learnt by skeletonpedia application media based on android with a score of 80%, a very practical category which concludes that the interest of students in learnt by skeletonpedia could be made skeletonpedia application media as a source of additional information that was a student required.

Obtained the data of student responses in understanding the material got a very practical category of 90% was related to the results of the validation on the instrument worthiness of the score with a score of 3.85 very valid categories that contain the suitability of the material with the correct concepts and basic competencies also appropriate learning indicators on the application media Skeletonpedia. Thus on the practical aspect, students expressed interest by used the skeletonpedia application media which contained material that was appropriate and easily understood in learning and supplemented the information needed by students regarding the sub-material of the skeletal system.

Other student responses were still found as many as 8.7% of students responses (Table 4) who felt less interested in the Skeletonpedia application media. Students also noted that they were still not interested in using android-based learning media. It could be influenced by the quality of learning pprocesses that is influenced by individual differences in students learning styles, cognitive abilities, learning speed and differences in backgrounds that built the characters and tastes of learning media preferred by students (Yektyastuti & Ikhsan, 2016).

Based on overall data on the results of responses and activities of students got a very practical category so the media skeletonpedia had been proved as a practical media in accordance with the media selection criteria accorded to Mahnun (2012) the criteria for media selection that can be approved are reviewed from 2 criteria, practicality which is seen from the user's familiarity with the type of media used and the assessment of space and time used by media, technical feasibility known as the validity accorded to the quality of the media that can support the learnt process of the students.

CONCLUSION

The developmental study had been done resulted android-based application media called Skeletonpedia. This application was about skeletal system which had highly valid category score of 3,86 with based on validation result of lecturers media and biology expert of UNESA and based on the test of observation activities got 100% score and response of 20 students got 91,3% for media practicality with each high category.

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REFERENCES

Arsyad, A. 2012. Media Pembelajaran. Jakarta: PT. Rajagrafindo Persada.

Chen, B., & deNoyelles, A. 2013. Exploring Students' Mobile Learning Practices in Higher Education. (Online), https://er.educause.edu/articles/2013/10/exploring-students-mobile-learning-practices-in-higher-education. (Diakses pada tanggal 16 Maret 2018).

Elissavet, G. dan Economides, A. 2014. Evaluation Factors of Educational Software. International Workshop on Advanced Learning Technologies. Vol: 10 No. 1: 113-116.

Gandhewar, N., & Sheikh, R. 2010. Google Android : An Emer ging Software Platform for mobile device. International Journal on Computer Science and Engineering, Vol. 01 No. 01: 12-17.

Hidayat, T. 2015. Penerapan Teknologi Augmented Reality Sebagai Model Media Edukasi Kesehatan Gigi Bagi Anak. Citec Journal, Vol. 2 No. 1:77-92.

Hidayati, N. 2013. Analisis Penggunaan Media Pembelajaran Pada Mata Pelajaran Ekonomi Materi Akuntansi Kelas XI IPS di SMA Negeri 1 Gedangan Sidoarjo. Jurnal Pendidikan Akuntansi (JPAK), Vol. 1 No. 3:100-110.

Mahnun, N. 2012. Media Pembelajaran (Kajian terhadap Langkah-langkah Pemilihan Media dan Implementasinya dalam Pembelajaran). *Jurnal Pemikiran Islam*, Vol. 37 No.1:27 – 34.

Mubarok, F. 2015. Pengembangan Media Pembelajaran Berbasis Mobile Application Menggunakan App Inventor pada Mata Pelajaran Mekanika Teknik untuk Siswa Kelas X Studi Keahlian Tgb SMK Negeri 3 Yogyakarta. (Skripsi Online), https://eprints.uny.ac.id/13145/. (Diakses pada tanggal 10 November 2018).

Mulyana, E. 2012. App Inventor "Ciptakan Sendiri Aplikasi Android- mu". Yogyakarta: CV ANDI OFFSET.

Mulyani, E. W. S. 2018. Dampak Pemanfaatan Aplikasi Android Dalam Pembelajaran Bangun Ruang. Jurnal Teknologi Pendidikan. Vol. 06 No. 02:122-136.

Murdiyani, I. 2012. Pembelajaran Biologi Menggunakan Metode E-Learning Berbasis Multiple Intelligences pada Materi Sistem Gerak Manusia. Innovative Journal of Curriculum and Educational Technology, Vol. 1 No. 1:105-115.

Musfiqon. 2012. *Pengembangan Media dan Sumber Pembelajaran*. Jakarta: PT. Prestasi Pustakaraya.

Noviar, D. 2016. Pengembangan Ensiklopedi Biologi Mobile Berbasis Android Materi Pokok Pteridophyta dalam Rangka Implementasi Kurikulum 2013. Jurnal Ilmiah Pendidikan, Vol. 10 No. 02:100-110.

Nurcahyono, F. 2012. Pembangunan Aplikasi Penjualan Dan Stok Barang Pada Toko Nuansa Elektronik Pacitan. Sentra Penelitian Engineering dan Edukasi, Vol. 04 No. 03:85-95.

Pertiwi S, Susantini E, Kuswanti N. (2015). Validitas Kartu Make A Match Pada Materi Sistem Pencernaan makanan Pada Manusia Untuk Kelas XI SMA. BioEdu (online) Vol. 4 No.1: 796-801.

Pranata, M. 2004. Efek Redundansi : Desain Pesan Multimedia dan Teori Pemrosesan Informasi. Jurnal Desain Komunikasi Visual. Surabaya : Universitas Kristen Petra. Vol. 6 No. 2: 171-182.

Riduwan. 2012. *Belajar Mudah Penelitian untuk Guru-Karyawan dan Peneliti Pemula*. Bandung: Alfabeta.

Smaldino, E. S., Lowther, L. D., & Mims, C. 2011. Instructional Technology and Media for Learning. Rahman, A., penerjemah. Jakarta: Kencana.

Sugiyono. 2008. Metode Penelitian Pendidikan. Bandung: Alfabeta.

Taufiqoh, P.L., Raharjo., & Indana, S. 2012. Profil Media Pembelajaran Interaktif Berbasis Komputer Pada Materi Sistem Peredaran Darah Manusia. Jurnal BioEdu, Vol. 1 No. 2:90-100.

Wijaya, R. I. 2013. Pengembangan Media Pembelajaran Berbasis Visualisasi 3D sebagai Suplemen Pendukung Pembelajaran Biologi pada Kompetensi Dasar Sistem Gerak Manusia untuk Siswa Kelas XI SMK Jurusan Keperawatan. Malang : Universitas Negeri Malang. Jurnal Teknik Elektro, Vol. 13 No. 02:200-210.

Yektyastuti, R., & Ikhsan, J. 2016. Pengembangan Media Pembelajaran Berbasis Android pada Materi Kelarutan untuk Meningkatkan Performa Akademik Peserta Didik SMA. Jurnal Inovasi Pendidikan IPA,Vol.02 No.01:88-9

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