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Development of E-Learning Assisted Biology Learning Media on Excretion Material in Class XI at SMA Negeri 1 Maesaan

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Abstract*: This research aims to develop Biology learning media and determine the feasibility and response of students to E-Learning learning media at SMA Negeri 1 Maesaan, Maesaan District. Data was collected using interviews and questionnaires and then analyzed using quantitative methods with a descriptive analysis approach. Based on the research results on "Development of E-Learning Assisted Biology Learning Media on Excretory Material in Class XI at SMA Negeri 1 Maesaan". It was found that the results of the feasibility test carried out by media experts obtained a result of 93% or "very feasible" to be used with 3 aspects of assessment, namely, technology, content, and media operations. As well as the results of the feasibility test by material experts, the results obtained were 89% or "feasible" to be used with 3 aspects of assessment, namely the technology, content, and material aspects, and the test results of student responses to the E-Book learning media obtained results of 86% with 3 aspects of assessment, namely: 1. Motivation to learn 2. Media effectiveness, 3. Language and communication. The conclusions in this research show that the development stages use a 4D (four-D) model. This 4D (four-D) development model has 4 stages: Define, Design, Develop. Disseminate is very suitable for use by reviewing a feasibility test from media and material experts and looking at the test results of student responses to the excretion system material.*

Keywords: *E-Learning, E-Book, Learning Results, Excretory System Material, Learning Media.*

Abstrak: Tujuan dalam penelitian ini adalah untuk mengembangkan media pembelajaran Biologi dan mengetahui kelayakan dan respon siswa terhadap media pembelajaran E-Learning di SMA Negeri 1 Maesaan Kecamatan Maesaan. Data dikumpulkan menggunakan teknik wawancara dan angket yang kemudian dianalisis menggunakan metode kuantitaif dengan pendekatan analisis deskriptif. Berdasarkan hasil penelitian tentang "Pengembangan Media Pembelajaran Biologi Berbantuan *E-Learning* Pada Materi Ekskresi Di Kelas XI di SMA Negeri 1 Maesaan". Maka ditemukan Hasil uji kelayakan yang dilakukan oleh ahli media diperoleh hasil sebesar 93% atau "sangat layak" digunakan dengan 3 aspek penilaian yaitu, teknologi, isi dan operasional media. Serta hasil uji kelayakan oleh ahli materi diperoleh hasil sebesar 89% atau "layak" digunakan dengan 3 aspek penilaian yaitu aspek teknologi, isi dan materi dan hasil uji respon siswa terhadap media pembelajaran E-Book di peroleh hasil sebesar 86% dengan 3 aspek penilaian yaitu: 1. Motivasi belajar, 2. Efektifitas media, 3. Bahasa dan komunikasi. Kesimpulan dalam penelitian ini menunjukan bahwa Tahapan pengembangan menggunakan model 4D (four-D). Model pengembangan 4D (four-D) ini memiliki 4 tahap yaitu Define, Design, Develop. Disseminate sangat layak digunakan dengan melalui Uji kelayakan dari ahli media dan materi serta dengan melihat hasil Uji respon siswa terhadap materi sistem ekskresi.

Kata Kunci: *E-Learning, E-Book,* Hasil Belajar, Materi Sistem Ekskresi, Media Pembelajaran.

INTRODUCTION

Information and Communication Technology (ICT) has developed rapidly along with globalization, so interaction and delivery of information will take place quickly. The influence of globalization can have a positive impact on a country because the developments that occur give rise to competition between nations and also require an increase in the quality

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of human resources. One means of improving the quality of human resources is through education. This is a challenge for the government in improving the quality of education. At the same time, it is a challenge for teachers to integrate computer technology to be used as learning media (Rusman, 2013).

Based on the results of Cimer's (2012) research on the difficulties and ways to increase the effectiveness of Biology learning (from students' perspective), most students suggested using visual media. Biology learning contains many abstract concepts and phenomena that require observation, so students must see what they are learning. Therefore, the students stated that if teachers use visual media in learning Biology, teaching and learning Biology can be more effective. Based on the results of an interview with one of the Biology teachers at SMA Negeri 1 Maesaan, Biology is still "monotonous" for students.

Most students only focus on one teaching material, and the teacher causes students to become passive and less active during learning. Other obstacles that often occur are the need for more media to show students about excretory material and the lack of utilization of facilities available at the school. In order to make it easier for students to study excretory material, interactive media is needed to arouse learning motivation in students.

The progress of internet technology is very much felt at SMA Negeri 1 Maesaan, such as the availability of sufficient computers and adequate Wi-Fi facilities that support students accessing the latest or newest information related to excretory material. However, the available facilities still need more attention at the school. The facilities available should enable students to look for other media to obtain the information they need and add reference material for excretion via the Internet.

Learning media that is appropriate and appropriate to the material will be very effective in supporting and increasing students' interest in participating in the learning process so that students will more readily accept the material presented. Technological developments have changed rapidly and are increasingly advanced, so teachers must be able to optimize internet services to carry out e-learning-based learning.

METHOD

This research uses the R&D (Research and Development) research method, which was carried out from June to September 2022. The research stages were divided into 2 stages, namely the identification and determination stages. The development stages are carried out by adopting the 4D (Four-D) method, namely Define, Design, Develop, and Disseminate, which is depicted in Figure 1 below:

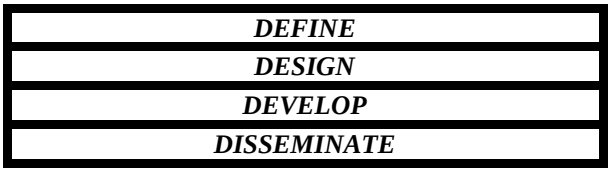

Figure 1. 4D Model Stage (four-D)

This research uses two data analysis techniques, namely qualitative descriptive analysis and descriptive statistical analysis. This qualitative descriptive analysis is used to manage data from interviews with trial subjects. This analysis technique is used by grouping data information in the form of responses, criticism or suggestions for improvement. This data analysis is used as a reference for improving or revising audio-visual based learning media development products.

Descriptive statistical analysis is used to process data collected from the questionnaire. The results of this questionnaire will be analyzed to get an idea of the quantitative value of the media to be developed. The formula (Sugiono, 2015) that researchers used in analyzing the data from this questionnaire is as follows:

$$P(s) = x100\%$$

Information:

P(S)=Overall percentage

S = overall weight obtained from each expert's questionnaire = calculated score

N = highest weight of the entire questionnaire = criteria score

The findings derived from computing the questionnaire assessment using the aforementioned method will thereafter be juxtaposed with the eligibility or validity requirements. Through this matching process, it will be determined whether the learning material generated by researchers is appropriate for use or not. The choice to assess appropriateness is based on a 5-point scale of achievement.

Table 1. Conversion of Achievement Levels on a scale of 5

Achievement Level	Qualification	Information
90%-100%	Very high	Very Decent, No Need to Revise
75%-89%	High	Decent, No Need to Revise
65%-74%	High enough	Not Appropriate, Needs to Be Revised
55%-64%	Not high enough	Not Appropriate, Needs to Be Revised
0%-54%	Very Less High	Very Inappropriate, Needs to Be Revised

RESULT AND DISCUSSION

A. Development of E-Learning Learning Media

E-Learning learning media refers to a learning model that is enabled and supported by information and communication technology (Hanum, 2013). E-learning refers to the utilization of information technology in the field of education, specifically in the virtual realm of cyberspace. E-learning refers to the deliberate attempt to convert the traditional learning process in educational institutions, such as schools or universities, into a digital format facilitated by internet technology (Munir, 2009: 169).

This research follows the media development process stages outlined by S. Thangarajan, Dorothy S. Semmet, and Melvyn in their development model. The development model proposed by Semmel Thiangarajan et al. is a 4D (four-dimensional) model. The 4D (four-dimensional) development model comprises four distinct stages: Define, Design, Develop. Dissemination refers to the act of spreading or distributing information or knowledge to a wider audience (Trianto, 2008). During this specific phase, the first step involves conducting a front-end analysis to examine underlying issues and anticipate future requirements. This process identifies potential issues. The researcher conducts observations to assess the state of teachers and students, instructional techniques, media, and learning materials employed. The subsequent phase involves the design (Model) stage, where the study conducts pre-production activities by creating electronic book learning medium. Subsequently, the development phase is undertaken following the sequential process of establishing a design for electronic book learning media. Subsequently, the current media design is reviewed and discussed with subject matter experts and instructional designers to enhance and refine it based on specific learning requirements. The ultimate phase is Disseminate. The execution of this stage takes place in small cohorts consisting of 10 students at SMA Negeri 1 Maesaan. Disseminate, or dissemination, refers to the deliberate action taken by researchers to extensively introduce the items they have generated. The subsequent are the phases of E-learning development:

- **Define**

In this stage the research is divided into several stages, namely:

1) Front End Analysis

The rare front end aims to analyze the basis of learning tools. Observations were carried out at SMA Negeri 1 Maesaan, Maesaan District. Information was obtained that students needed help understanding the material on human and animal excretory systems because it had terms that were difficult to understand. The presentation of material by the teacher in the

learning process was focused on the structure of the textbook's contents. Hence, students felt bored and less enthusiastic during the learning process.

From the results of this analysis, this problem can be overcome by developing excretory system material in the form of an E-book with a dancing material presentation and book design that can make students enthusiastic in the learning process.

From the results of observations of class, it was also obtained that the books used were only taken from publishing services or book packages. This teaching and learning process activity is less creative and varied, so students experience difficulties in mastering biological concepts, including extensive material about the excretory system. From the results of this observation, excretion system material was developed as an e-book, which is hoped to trigger students' enthusiasm to be more active in the teaching and learning process so that the learning process is no longer monotonous but more creative and varied.

2) Concept Analysis

This analysis was carried out to identify, detail, and systematically organize the concepts taught using e-books in the excretory system material. In rare concept analysis, identification is first carried out in the e-book that will be used, which aims to detail and organize concepts related to the learning material, such as: 1. the excretory system in humans, namely the kidneys, skin, liver, and lungs. 2. Excretory systems in land and aquatic animals and excretory systems in vertebrate and invertebrate animals.

3) Formulate Learning Objectives

Formulating learning objectives aims to determine boundaries in research, especially learning objectives. In this research, learning objectives are formulated based on essential competencies and indicators. The learning objectives created will be used as a reference in developing an E-book on excretory system material.

- **Design**

In this stage, learning media design is related to knowledge and research development ideas such as implementing display design, collecting the necessary components, compiling text, and determining the software and supporting applications that will be used. Researchers apply design concepts to E-book media, such as display colors, writing fonts, and supporting images by the material, and researchers take the required components from sources such as books, the internet, graphics provider applications, and others.

- **Develop**

The development stage was initially started using the Microsoft Word application to create excretory materials, media content, images, fonts, colors, and models according to the

designed design. Then, start making E-book covers online, combining all the material components, and converting them into PDFs online.

B. Feasibility of Media and E-Book Learning Materials on Excretory System Material

1. Feasibility of Learning Media

After going through an examination by a media expert, the feasibility of the E-Book learning media on human and animal excretory system material was obtained by the results of a feasibility test by a media expert by filling out a questionnaire, which was the assessment instrument given by the researcher. The width of the media feasibility test questionnaire consists of 3 aspects: 1. Technological aspects, 2. Content aspects, 3. Material aspects. Eligibility data by media experts can be seen in the table below.

Table 2. Description of the results of the feasibility assessment of e-book learning media by media experts

No	Statement	EVALUATION				
		1	2	3	4	5
Technological Aspects						
1	Accuracy in selecting the type of software as a learning media development tool				4	
2	Suitability of learning media to the material					5
3	The potential of media in facilitating learning content contained in the material					5
Content Aspect						
4	Suitable layout				4	
5	Color proportions					5
6	Typography (fort and arrangement of letters)				4	
7	Clarity of the language used.					5
8	Ease of language to understand					5
9	Appropriateness of module size, text and image types				4	
10	Learning can be followed well through this media					5
11	The media content presented is interesting					5
Media Operations						
12	Creativity and innovation in learning media					5
13	Opportunities for science and technology development				4	
14	Ease of media to use					5
15	Has its own advantages and characteristics (in terms of content, presentation and so on).					5

Table 3. Data on the Feasibility of E-Book Learning Media by Media Experts

No	Assessment Aspects	Score	Max Score	Percentage %	Criteria
1	Technology	14	15	93%	Very Worth It
2	Contents	37	40	92%	Very Worth It
3	Material	19	20	95%	Very Worth It
Total Overall Aspects		70	75	93%	Very Worth It

Based on the results of the assessment by media experts, table 3 above shows that the results of the feasibility of E-Book learning media by media experts obtained a total percentage of 93% with details of each aspect of acquisition, technological aspects 93%, content 92% and material aspects 95%. The overall aspects obtained are matched with the assessment categories,

so the total obtained from the learning media feasibility test meets the criteria for being very suitable for use.

2. Appropriateness of Learning Materials

For the feasibility of the excretion system material in learning media using E-Books, the assessment results from media experts were obtained; the assessment consisted of 3 aspects, namely 1—technology aspect, 2. Content aspect, 3. Material aspect. Feasibility data by material experts can be seen in the table below.

Table 4. Description of the results of the feasibility assessment of e-book learning media by material experts

NO	STATEMENT	EVALUATION				
		1	2	3	4	5
Technological Aspects						
1	Accuracy in selecting the type of software as a learning media development tool				4	
2	Suitability of learning media to the material				4	
3	The potential of media in facilitating learning content contained in the material				4	
Content Aspect						
4	Suitable layout					5
5	Color proportions				4	
6	Typography (fort and arrangement of letters)				4	
7	Clarity of the language used.					5
8	Ease of language to understand				4	
9	Appropriateness of module size, text and image types				4	
10	Learning can be followed well through this media					5
11	The media content presented is interesting					5
Material Aspects						
12	Relevance of material to learning objectives					5
13	Suitability of providing examples of images or videos related to the material				4	
14	The excretory system material is clear and specific					5
15	Has its own advantages and characteristics (in terms of content, presentation and so on).					5

Table 5. Data on the Feasibility of E-Book Learning Media by Material Experts

No	Assessment Aspects	Score	Max Score	Percentage %	Criteria
1	Technology	12	15	80%	Worthy
2	Contents	36	40	90%	Very Worth It
3	Material	19	20	95%	Very Worth It
Total Overall Aspects		67	75	89%	Worthy

The data in Table 5 shows that the material feasibility results of the excretion system tested by material experts obtained material feasibility results with a total percentage of 89%. The results of the material feasibility test were obtained with a result of 80% for the technology assessment aspect, and in the material content assessment aspect, the score was 90%, and for the material aspect, the result was 95%. The overall feasibility results are obtained by looking at the criteria that have been determined. Then, the criteria for suitability are obtained for the feasibility test of the excretion system material.

3. Student Response to E-Book Learning Media on Excretory System Material.

Table 6. Description of the Results of Student Responses to E-Book Learning Media on Excretory System Material

No.	SS		S		RR		TS		STS		Total	
Statement	F	%	F	%	F	%	F	%	F	%	F	%
1	6	60%	4	40%	-	-	-	-	-	-	100	100%
2	6	60%	4	40%	-	-	-	-	-	-	100	100%
3	3	30%	7	70%	-	-	-	-	-	-	100	100%
4	2	20%	8	80%	-	-	-	-	-	-	100	100%
5	3	30%	7	70%	-	-	-	-	-	-	100	100%
6	4	40%	6	60%	-	-	-	-	-	-	100	100%
7	3	30%	7	70%	-	-	-	-	-	-	100	100%
8	2	20%	8	80%	-	-	-	-	-	-	100	100%
9	2	20%	8	80%	-	-	-	-	-	-	100	100%
10	2	20%	8	80%	-	-	-	-	-	-	100	100%
11	5	50%	5	50%	-	-	-	-	-	-	100	100%
12	4	40%	6	60%	-	-	-	-	-	-	100	100%
13	3	30%	7	70%	-	-	-	-	-	-	100	100%
14	3	30%	7	70%	-	-	-	-	-	-	100	100%

A small-scale trial was conducted at SMA Negeri 1 Maesaan, Maesaan District, with research subjects, namely 10 students in class by printout or Google form consisting of 14 statements based on aspects of the research objectives. Results of student responses to E-Book learning media on excretory system material

Table 7. Student Response Data to E-Book Learning Media on Excretory System Material

No	Assessment Aspects	Score	Max Score	Percentage %	Criteria
1	Motivation to learn	131	150	87%	Worthy
2	Media Effectiveness	214	250	85%	Worthy
3	Language and Communication	259	300	86%	Worthy
Total Overall Aspects		604	700	86%	Worthy

Based on Table 7 above, the results of student responses were obtained by giving a questionnaire with 14 statements with 3 categories filled in by 10 students formed in small groups. The number who chose the "strongly agree" category was 48 frequencies, and the number who chose the "agree" category was 92. After all aspects of the assessment were calculated, the results of the trial of Student Responses to E-Book Learning Media obtained a percentage of 86%; by looking at the "appropriate" assessment scale criteria, the e-book learning media on excretion system material was suitable for use by students.

C. Discussion

1. Stages of E-Book Learning Media Development on Excretory System Material.

At the development stage of E-Book learning media using research and development methods or what is usually called research and development (R&D) research, this research method is used to produce specific products, test their effectiveness, and improve existing

products. In this research, the form of learning media uses e-books, which can be used easily via a notebook or smartphone.

The planning stage began with observations and interviews with SMA Negeri 1 Maesaan biology teachers. Based on the results of research in the form of observations and interviews, it shows that there are no other learning media used in the teaching and learning process other than textbooks that the school has provided, so this results in a lack of student interest in learning, especially in excretion system material that requires media other than textbooks. To make students interested in reading and make it easy to understand the material, especially in the excretory system material. Because learning media is needed, it is easy for teachers or students to use when studying in class or at home.

Based on this, the development of learning media uses E-Books to help the learning process of students and teachers. With the E-learning learning method using E-book learning media, students can optimize study time to study independently, efficiently, comfortably, and easily anytime and anywhere just using a smartphone.

2. Feasibility Test Results for E-Book Learning Media on Excretory System Material by Media Experts

Based on the results obtained by going through the feasibility test stages that media and material experts have carried out in class XI IPA excretion system material with a media feasibility test assessment, consisting of 3 aspects: technology, content, and media operations. The percentage results obtained were 93% of all aspects, so the learning media developed was very suitable for use.

The results of the feasibility test by material experts showed that the percentage of all aspects was 89% or suitable for use, so based on the results of the media and material feasibility test, it shows that this E-Book learning media is very suitable for use as additional learning media for students in studying and understanding the material—excretory system.

3. Feasibility Test Results for E-Book Learning Materials on Excretory System Material by Material Experts

The results of the material feasibility test on the excretion system in the E-Book learning media to find out whether the material in the media that has been created is suitable for use. The material feasibility test assessment results by material experts consist of 3 aspects: technological, content, and material.

Testing of the excretion system material by material experts with the first highest percentage in the material aspect, namely 95% with the criteria for being suitable for use, the material created can explain the attachment to the media used, The excretion system material

used can foster students' understanding of the material being taught so that they get good grades. High on the material suitability test.

Testing the excretory system material, which received the second highest score with a percentage of 90%, namely the content aspect with the criteria of being very suitable for use, the content aspect obtained the second highest score due to the breadth of the material, which was made by essential competencies. These learning indicators were by the material that had to be taught. The third percentage, with a result of 80% with criteria suitable for use, is the technological aspect. It can be concluded that using E-book technology is of the excretory material that will be used.

4. Results of Student Responses to E-Book Learning Media on Excretory System Material

Based on trials of biology learning media using E-Books on excretory system material, it was carried out in class 3: language and communication.

The assessment results obtained from the learning motivation aspect were 87%, with the criteria being suitable for use as a learning medium; from the learning effectiveness aspect, the results were 85% or suitable for use, and in terms of the language and communication aspects, the results were 86%.

From the overall results of the students' responses to learning media using E-Books, a total score of 86% was obtained, which means that students gave a positive response which stated that E-Book learning media made students motivated to study excretory system material with practical, easy and effortless media. Must be bound to time and place and presented in language that is easy to learn and understand according to the student's ability to receive the material

CONCLUSION

Based on the results, it can be concluded that:

1. Development stages using the 4D (four-D) model. This 4D (four-D) development model has 4 stages: Define, Design, Develop. Disseminate is very suitable for use by reviewing a feasibility test from media and material experts and looking at the test results of student responses to the excretion system material.
2. The feasibility test results carried out by media experts obtained a result of 93% or "very feasible" to be used with 3 assessment aspects: technology, content, and media operations. As well as the feasibility test results by material experts, the results were 89%

or "feasible" to be used with 3 assessment aspects, namely technological, content, and material aspects.

3. The results of the student response test to the E-Book learning media obtained a result of 86% with 3 assessment aspects, namely: 1. Learning motivation, 2. Media effectiveness, 3. Language and communication.

REFERENCES

Anonim. (2023) Sistem Ekskresi Pada Manusia. (*E-Book*, h. 4-12) Anonim, *Sistem Ekskresi Pada Hewan Vertebrata dan Invertebrata*.

Arif Budi Utomo, Upik Yelianti, Muswita dan Ervan Johan Wicaksana. (2022). Pengembangan E-Book Berbasis Mobile Learning Pada Mata Kuliah Struktur Tumbuhan. Bioedukasi: *Jurnal Pendidikan Biologi*, Vol 11. No 2. Hal 95-106.

Daniel S. Wibowo. (2007). *Anatomi Tubuh Manusia*. Jakarta: Graha Ilmu, h. 347.

Eva Latifah Hanum, dkk,. (2009). Biologi 2, (Jakarta: Pusat Perbukuan Departemen Pendidikan Nasional) hal. 193-194.

Ela Suryani dan Ika Silfiana Arifatul Khoiriyah. (2018). Pemanfaatan E-Book Sebagai Sumber Belajar Mandiri Bagi Siswa SMA/SMK/MA. *Internasional Journal of Community Service Learning*, Vol 2. No 3. Hal. 177-184

Gall, M. D., Gall, J. P., dan Borg, W. R. (2003). Educational Research: An Introduction (7th Edition), Pearson Education. Inc, United State of America

Kiswanto, H. dan Amin, S. M. (2013). Pengembangan Media Pembelajaran Interakti Berbantuan Komputer pada Materi Dimensi Tiga. http://www.ejournal.unesa.ac.id , diakses 15 desember 2014.

Mesi Sunarsih. (2017). *Penerapan Model Discovery Learning Dan Media Audio Visual Pada Materi Sistem Ekskresi Terhadap Aktivitas Dan Hasil Belajar Siswa Kelas Xi Sman I Baitussalam Aceh Besar*, Skripsi, Program Studi Pendidikan Biologi.

Miftah. (2013), *Fungsi, dan Peran Media Pembelajaran Sebagai Upaya Peningkatan Kemampuan Belajar Siswa*, Jurnal Kwangsan, Peneliti Bidang Pendidikan padaBPMP Kemdikbud

Muttaqim, Z. dan Amin, S. M. (2013), Pengembangan LKS Berbasis Inquiry Menggunakan Software Geometer's Sketchpad pada Materi Hubungan Antar Sudut pada Garis Sejajar Dipotong Garis Lain, http://www.ejournal.unesa.ac.id, diakses 15 Desember 2014.

Nunu Mahnun. (2012). *Media Pembelajaran (Kajian terhadap Langkah-langkahPemilihan Media dan Implementasinya dalam Pembelajaran),* Jurnal Pemikiran Islam, Dosen Fakultas Tarbiyah dan Keguruan UIN Suska Riau. Rudi Susilana dan Cepi Riyana, Media Pembelajaran, (Bandung: Wacana Prima, 2009), h. 6.

Olyfia Pratiwi. (2019). *Pengembangan Media Pembelajaran Biologi Berbasis Web Pada Materi Evolusi Kelas Xii Di Sma Negeri 1 Meulaboh*, Skripsi, Program Studi Pendidikan Biologi

Rusman. (2013). *Belajar dan Pembelajaran Berbasis Komputer*. Bandung: Alfabeta, h.1

Salahudin. (2016). Pengaruh Penggunaan Media Work Sheet Pada Pembelajaran Ekonomi Dalam Meningkatkan Proses Dan Aktivitas Belajar Siswa Kelas X DiSma Negeri 2 Bolo Tahun Pelajaran 2015/2016. *Jurnal Pendidikan Mandala*, Guru SMA Negeri 2 Bolo

Sulistyo Hanum. (2013). Keefektifan E-Learning Sebagai Media Pembelajaran (Studi Evaluasi Model Pembelajaran E-Learning Smk Telkom Sandhy Putra Purwokerto). *Jurnal Pendidikan Vokasi*, Program Studi Pendidikan Teknologidan Kejuruan PPs UNY

Syaifuddin. (2011). *Anatomi Tubuh Manusia*, (Jakarta: Salemba Medika), h. 387-388

Syaifuddin. (2001). *Fungsi Sistem Tubuh Manusia*, (Jakarta: Widya Medika), h. 219-220

Tambunan. Dkk (2021). *Model Pembelajaran Berbasis E-Learning Suatu Tawaran Pembelajaran Masa Kini Dan Masa Yang Akan Datang*, Dosen FakultasTeknik Universitas Negeri Medan

Tika, I Ketut.(2005). Implementasi Strategi 5E dengan Bahan Ajar Bermuatan Perubahan Konseptual Sebagai Upaya Mengubah Miskonsepsi dan Meningkatkan Hasil Belajar Siswa SMPN 6 Singaraja, Skripsi, Universitas Pendidikan Ganesha, Bali.