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The Validity of the Human Circulatory System Concepts Handout at Class XI IPA SMAN 6 Banjarmasin

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ABSTRACT

The use of good and appropriate teaching materials during the teaching and learning process can make learning more meaningful, namely creating an atmosphere of active learning for students, so that students can achieve the competencies expected by understanding the concepts of learning. The concept of the human circulatory system is a Biological concept that is relatively difficult to understand, so research and development of teaching materials are carried out in the form of handouts. This research and development aim to describe the validity of the concept handout of the human circulatory system of class XI IPA SMAN 6 Banjarmasin. This research is a type of research and development with a 4D development model. This research is limited only to the Develop stage. The results of the research and development of the concept handout of the human circulatory system of class XI IPA SMAN 6 Banjarmasin are classified as very valid with a validity value of 90%.

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A. Introduction

One of the problems in the learning process is to choose and determine good and appropriate teaching materials. Students can achieve learning objectives including using appropriate and good teaching materials during the learning process. According to Depdikbud (2008), the selection and determination of good teaching materials must meet interesting criteria, help students to achieve competence so that teaching materials are made according to the needs and compatibility with the basic competencies that must be achieved by students. The form and type of teaching materials are determined based on curriculum analysis and analysis of the source of teaching materials beforehand.

Teaching materials are all materials in the form of written and unwritten materials (both information, tools, and texts) that are arranged systematically, which displays a complete figure of the competencies that will be mastered by students and used in the learning process for planning and reviewing implementation learning. The teacher can use teaching materials to support the learning process. One of the teaching materials that can be used is handouts. A handout is a form of written teaching material that contains a summary of material from various relevant sources with basic competencies created by the teacher to guide and help students in the learning process (Prastowo, 2015).

Biology material for class XI in 2013's curriculum contains concepts related to systems in the human body. The scope of the material is quite a lot of obstacles for students to remember and understand the material, so it is necessary to have teaching materials that help students' understanding. This is supported by the results of the analysis of the

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need for the development of Biology teaching materials for class XI IPA of SMAN 6 Banjarmasin filled with Biology teachers. It can be concluded that the material of the human circulatory system as one of the material on the concept of systems in the human body requires the development of teaching materials because these materials are difficult for participants to understand students and cannot be observed directly.

Based on the analysis of the needs of students towards the development of Biology teaching materials for class XI IPA at SMAN 6 Banjarmasin filled by students at SMAN 6 Banjarmasin it is known that 68.1% of students choose the circulatory system material as Biology material which requires additional teaching materials. The results are known that most of the Biology learning so far still use textbooks, LKPD, videos, and web-based teaching materials. The results of the questionnaire showed that as many as 86.9% of students needed the use of other teaching materials to support the learning process and increase understanding of Biology material in class XI. The results of the questionnaire also showed that 91.3% of students liked teaching materials that were interesting and colorful.

The competency demands on the concept of the human circulatory system are that students are expected to be able to analyze the processes related to the circulatory system with quite extensive material. The scope of subject matter for the concept of the human circulatory system includes the functions of the circulatory system, blood components, circulatory devices, blood groups, circulatory mechanisms, blood-clotting mechanisms, disorders or abnormalities related to the circulatory system and current developing technologies that related to the circulatory system in humans.

Based on this explanation, this research and development aim to describe the validity of the concept handout of the human circulatory system of class XI IPA SMAN 6 Banjarmasin.

B. Materials and Methods

This research handout is a type of research and development (R & D). The development model used is the 4D development model by Thiagarajan, et al. (1974) consists of Define, Design, Develop, and Disseminate. The 4D development model is only implemented up to the third stage, the development stage as needed.

The place of this research is SMA Negeri 6 Banjarmasin with its address at Jalan Belitung Darat No. 130, RT. 19 / RW. 02, Belitung Utara, Kecamatan Banjarmasin Barat, Banjarmasin City, South Kalimantan Postal Code 70116. This research and development were carried out during one semester of the 2019/2020 school year.

This research and development procedure refers to the 4D model that has been modified. As for the outline, the development steps consist of the stages of define, design, and development. Define phase includes 4 main steps, namely curriculum analysis, student characteristics analysis, material analysis, and formulating objectives. The design stage includes the selection of teaching materials, format selection, and initial design. The develop stage includes the apprentices carried out by 3 expert validators.

Expert validation score calculations are performed using formulas according to Akbar (2013).

$$V = Tse/Tsh \times 100\%$$

Information:
V : Validity
TSe : Empirical Total Score
TSh : Maximum Total Score

The results of the known validity of the percentage can be matched with the validity criteria according to Akbar & Sriwiyana (2010) in table 1.

Table 1 The Criteria of Validity

Score	Validity	Information
75,01% - 100%	Very Valid	Can be used without revision
50,01- 75,00%	Quite Valid	Can be used with minor revisions
25,01% - 50,00%	Less Valid	Can't be used
00,00% - 25,00%	Very Invalid	Forbidden to use

C. Results and Discussion

The Handout Concept on Human Circulatory System of Class XI IPA was made based on the results of a preliminary study with an

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analysis of the need for teaching materials and combining some of the material contained in the student textbooks. The results of the learning handout validation were obtained through validation results by 3 experts. The recapitulation of the results of validation per aspect by experts can be seen in the following table 2.

Table 2 Recapitulation of the Validation Results

No	Validated Aspects	Score (%)			Average (%)
		V1	V2	V3	
1	Relevance	83	98	85	88
2	Accuracy	100	88	100	96
3	Completeness of Serving	94	100	94	96
4	Serving Systematics	88	75	75	79
5	The suitability of the presentation with the demands of learning centered on students	90	95	90	92
6	Serving method	83	92	88	88
7	The suitability of the language with the rules of Indonesian language is good and right	92	100	100	97
8	Readability and communicative	75	81	100	85
Average		**88**	**91**	**91**	**90**
Total Average (%)				**90**	
Conclusion				**Very Valid**	

Information: V1 = Validator 1 (expert), V2 = Validator 2 (expert), V3 = Validator 3 (expert)

Based on table 2 data it is known that the Handout concept of the Human Circulatory System developed has an average validation value of 90%.

The process of developing teaching materials has stages and certain rules following the model of development undertaken. The process of developing Four D teaching materials goes through several stages namely define, design, develop, and disseminate. One of the stages that are included in the core steps of developing teaching materials is the validation test. Validation tests are carried out to produce good teaching materials that are relevant to the theoretical foundation of development (Akbar, 2013).

Validation of the developed handouts is very important to get the value of eligibility from experts. The validation phase was carried out by three experts namely two lecturers of the Department of Biology Education FKIP ULM and one Biology teacher at SMAN 6 Banjarmasin. Depdikbud (2008) explains that product validation aims to obtain recognition or endorsement of product compatibility with needs so that it is appropriate and suitable for use in learning. The feasibility test conducted by experts is very important to ensure the appropriateness of the teaching material is used in the learning process and to test the content or material in terms of depth and breadth as well as the suitability of the material presented in the modules developed (Marlina et al., 2015; Sari & Iza, 2018). This was also confirmed by Rahmayani, et al. (2015) that a handout validation was carried out to find out the shortcomings and weaknesses of the Biology handout so that a revision or improvement in design was needed so that the Biology handout was declared feasible and could be used as teaching material.

Teaching material has a very important meaning for teachers and students in learning activities. Teaching material is seen as a means that must be able to communicate information, concepts, knowledge, and develop abilities in such a way that they can be understood properly by teachers and students. Teaching materials must be able to present objects systematically for learning needs and provide a good touch of affective, social, and cultural values to comprehensively make students not only able to develop cognitive abilities but also affective and psychomotor (Salirawati, 2010).

Based on an evaluation by experts of the handout developed on the Concept of the Human Circulatory System, the validation results obtained an average of 90%, which means it is very valid and can be used based on the range of validity criteria by Akbar & Sriwiyana (2010). Some suggestions from the

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validator for the development of handouts that are more applicable and perfect in terms of the material so that it is worth using in the learning process. Results of handout development research from Novitaningrum, et al. (2014) is also worth very much, with an average percentage of eligibility of 91.67%. The results of research by Hermawati, et al. (2017) and Rozalia, et al. (2018) ie the Biology handout that was developed showed very good and very valid criteria so that it was feasible to use it with revisions to a small portion of the handout as suggested by the validators.

Learning handout assessment developed refers to 8 aspects, namely aspects of relevance, aspects of accuracy, aspects of the completeness of the presentation, systematic aspects of the presentation, aspects of conformity with the demands of learning that are centered on students, presentation aspects, aspects of language suitability with good and correct Indonesian language norms and aspects of readability and communication. Based on the validation results assessed by three experts, the revision of the handout still needs to be done based on the suggestions and input from the validator to produce a product that is suitable for use. This revision is very important to do to produce better products (Sugiyono, 2010). It was also explained by Depdikbud (2008) that the revision is the process of perfecting the product after obtaining input from the results of the validation aimed at the comprehensive finalization of the product so that the product matches the input from the validation activity.

Some of the improvements made according to expert input are the first aspect, namely relevance such as making practice questions and evaluation questions that are following indicators of competency achievement that are expected to be achieved by high school students. Depdikbud (2008) states that handouts are written teaching materials prepared by teachers to enrich students' knowledge and are usually taken from some literature that has relevance to the material being taught or basic competencies and subject matter that must be mastered by students. Akbar (2013) also reinforces that handouts should fulfill construction requirements related to the clarity of sentence structure, use of language, alignment between learning objectives. The function of the handout is to help students not have to take notes, educator explanatory companions, student reference materials, motivate students to be more active in learning, reminders of the subject matter taught, provide feedback, and assess learning outcomes (Mahrudin & Dharmono, 2018).

The second aspect is accuracy such as enlarging and clarifying sample images and adding points to practice questions. According to Ningtyas & Tri (2014), a good handout is a handout that can be used as a companion of teaching materials used by teachers, written using good language and easy to understand, presented attractively and equipped with pictures, the contents of the handout can also help activate students in the process learning. This aspect of accuracy is in line with Mahrudin & Dharmono (2018) which states that the suitability of the material with the development of knowledge in the handout must meet the actual category or following the development of science.

The third aspect is the completeness of the presentation by improving the use of operational verbs in the indicators of competency achievement. Teaching material in the form of a handout contains a summary of important concepts from material so that it can facilitate the reader to master, understand, and remember the concepts learned (Sanaky, 2011). Mahrudin & Dharmono (2018), states that the aspects of the feasibility assessment of presentation are divided into three indicators, namely the technique of presentation, presentation of material, and completeness of the presentation.

The aspects of conformity with the demands of student-centred learning are fulfilled by adding specific information that can trigger student curiosity such as the bio info column and the critical thinking column. According to Hera, et al. (2014) technical presentation of concise and easy-to-remember handout material and the development of contextual issues in it makes the teaching material meaningful, so that it can attract the attention of students to follow and explore knowledge in depth because students are generally more interested in knowing which correlates with life. A good handout must have consistency, format, and attractiveness to the reader and the information contained therein must be up-to-date that describes current events by adding facts, concepts, and

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symptoms contained in the community, because the teacher always associates the symptoms that exist in the surrounding environment, by providing examples in the surrounding environment, so students are easier to explore the material (Novitaningrum et al., 2014).

The fifth aspect is the presentation aspect such as harmonizing the type of letter and its size so that there is no blank space on the handout, eliminating the watermark on the handout and adjusting the color of the type of letters contained in the columns and linking the concepts described with the verses in the scriptures in support of piety to The One Almighty God. The results of the study by Qomariyah & Setiawan (2016) concluded that the Biotechnology handout has attracted students' interest in studying Biology especially the benefits in practice. Display illustrations clearly and attractively will increase the motivation of students to learn teaching materials, the existence of illustrations in teaching materials will facilitate students' understanding because the information provided is presented in two formats, namely verbal and visual (Leksono et al., 2015).

In addition to the five aspects, from the aspect of the suitability of the language with good and correct Indonesian language rules and readability and communication aspects, improvements were also made such as (1) adjusting the table of contents, drawing list, list of tables, concept maps of the changes made, (2) improve the layout of words, grammar words, with the location of dots and commas in each sentence, (3) improve the layout of the order of chapters and material so that it is systematic. Based on research conducted by Suwarni (2015), it is known that the language used in teaching materials must be simple, straightforward, and communicative. Besides, the language used must be following the General Guidelines for Indonesian Spelling (PUEBI) that are correct and use terms that are following the concept of discussion. The use of good language is following Indonesian grammar rules that refer to PUEBI.

According to Novitaningrum, et al. (2014) the use of language needs to be considered so that it is easily understood by students in learning material, and encourage students to learn to use handouts. Submission of material that is between antinatalists in one paragraph reflects the complexity and relevance of the contents of the material. The consistency of the term is very important so as not to cause misunderstanding for students. Students' understanding of the material is also determined by the use of interesting language and can provide an illustration or illustration that is relevant to the material presented. The language used should be communicative, dialogic, and interactive, so that it can foster a sense of pleasure when students read it, allowing students as if communicating with the author and encouraging them to study the handout thoroughly. In line with Riefani (2019) which states that the presentation of learning resources in simple language can make it easier for students to learn them.

The concept Handout for the Human Circulatory System developed has the following features. The additional info in the form of a bio info column and a column let's think critically, presents a colorful design and a glossary, there is a clear illustrated image so that it can reduce verbality, the material presented following real life, the ruffle of the material presented and the language used is simple.

D. Conclusion

The results of the development of the Human Circulatory System concept handout of Class XI IPA SMAN 6 Banjarmasin have a validity value of 90% which is classified as a very valid criterion based on the results of validation by 3 experts with the need for revision or improvement for product perfection.

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F. References

Akbar, S., & Sriwiyana, H. (2010). *Pengembangan Kurikulum dan*

p-ISSN : 2684-9062
e-ISSN : 2714-9803
DOI: 10.20527/bino.v2i1.7885

Pembelajaran Ilmu Pengetahuan Sosial. Yogyakarta: Cipta Media.

Akbar, S. (2013). Instrumen Perangkat Pembelajaran. Bandung: PT Remaja Rosdakarya.

Departemen Pendidikan Nasional (Depdiknas). (2008). *Kurikulum Tingkat Satuan Pendidikan*. Jakarta: Pusat Perbukuan.

Hera, R., Khairil, & Hasanuddin. (2014). Pengembangan Handout Pembelajaran Embriologi Berbasis Kontekstual pada Perkuliahan Perkembangan Hewan Untuk Meningkatkan Pemahaman Konsep Mahasiswa Di Universitas Muhammadiyah Banda Aceh. *Jurnal EduBio Tropika*, *2*(2): 187-250.

Hermawati, Y. Hastuti, U. S., & Lukiati, B. (2017). Pengembangan Handout Biologi SMA "Pembuatan Nata SariaBuah Nangka". *Jurnal Pendidikan:Teori, Penelitian, dan Pengembangan*, *9*(2): 1212-1214.

Leksono, S. M., Syachruroji, A., & Marianingsih, P. (2015). Pengembangan bahan ajar biologi konservasi berbasis etnopedagogi. *Jurnal Kependidikan: Penelitian Inovasi Pembelajaran*, *45*(2): 168-183.

Mahrudin & Dharmono. (2018). Pengembangan Handout Struktur Populasi Tumbuhan Kawasan Tepi Sungai Maluka Kabupaten Tanah Laut Pada Mata Kuliah Ekologi Tumbuhan. *Prosiding Seminar Nasional Lingkungan Lahan Basah*, (Vol. 3 No. 2, pp. 563-567).

Marlina, R., B. Hardigaluh, & Yokhebed. (2015). Pengembangan Modul Pengetahuan Lingkungan BerbasisaPotensi Lokal untuk Menumbuhkan Sikap Peduli Lingkungan Mahasiswa Pendidikan Biologi. *Jurnal Pengajaran MIPA*, *20*(1): 94-99.

Ningtyas, R. & Tri N. H.Y. (2014). Pengembangan Handout Pembelajaran. *Jurnal Scholaria*, *4*(3): 42-53.

Novitaningrum, M., Parmin, P., & Pamelasari, S. D. (2014). Pengembangan Handout IPA Terpadu Berbasis Inkuiri Pada Tema Mata Untuk Kelas IX Siswa MTS Al-Islam Sumurejo. *Unnes Science Education Journal*, *3*(2): 542-548.

Prastowo, A. (2015). *Panduan Kreatif Membuat Bahan Ajar Inovatif*. Yogyakarta: Diva Press.

Qomariyah, I. N., & Setiawan, R. (2016). Pengembangan Handout Bioteknologi SMA dan Sederajat. *Edubiotik: Jurnal Pendidikan, Biologi dan Terapan*, *1*(01): 1-4.

Rahmayani, F., Hindun, I., & Hudha, A. M. (2015). Pengembangan Handout Berbasis Kontekstual Pada Pelajaran Biologi Materi Bioteknologi Untuk Siswa Kelas XII SMK Negeri 02 Batu. *Jurnal Pendidikan Biologi Indonesia*, *1*(1): 47-59.

Riefani, M.K. (2019). *Pengembangan Handout Keanekaragaman Jenis Capung di Kawasan Universitas Lambung Mangkurat Banjarmasin*. Tesis, Universitas Lambung Mangkurat. Tidak dipublikasikan.

Rozalia, A., Kasrina, K., & Ansori, I. (2018). Pengembangan Handout Biologi Materi Keanekaragaman Hayati Untuk SMA Kelas X. *Diklabio: Jurnal Pendidikan dan Pembelajaran Biologi*, *2*(2): 44-51.

Salirawati, D. (2010). *Teknik Penyusunan Modul Pembelajaran*. Jakarta: Pusat Perbukuan.

Sanaky, H. (2011). *Media Pembelajaran "Buku Pegangan Wajib Guru dan Dosen."* Yogyakarta: Kaukaba Dipantara.

Sari, N. K., & Iza, N. (2018). Pengembangan Handout Evolusi Berbasis Hasil Penelitian Profil DNA Fingerprinting. *Edubiotik: Jurnal Pendidikan, Biologi dan Terapan*, *3*(2): 37-47.

Sugiyono. (2010). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.

Suwarni, E. (2015). PengembanganaBuku Ajar Berbasis Lokal Materi Keanekaragaman Laba-laba di Kota Metro Sebagai Sumber Belajar Alternatif Biologi untuk Peserta didik SMA Kelas X. *Jurnal Pendidikan Biologi*, *6*(2): 86-92.

Thiagarajan, S., Semmel, D., & Semmel, M. (1974). *Instructional Development for Training Teachers of Exceptional Children*. Washington DC: National Center for Improvement Educational System.