

Turnitin. Respiratory System: A Learning Content Development

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Respiratory System: A Learning Content Development System-based Student Worksheet in Biology

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Abstract. This study aims to develop student worksheets based on Learning Content Development System (LCDS) to help and motivate students to participate in classroom learning. This research development research using the Borg and Gall research model, with seven stages, namely the preliminary study, the planning stage, the product development stage, the design validation stage, the testing and revision of the results. The results of this study indicate that the development of LCDS-based worksheets is in the very feasible category, can be used easily, with instructions for use, encourages students to learn optimally, presents interestingly, and is not dull. Student worksheets can be developed with various innovations as learning materials and media for students.

Keywords: LCDS, Respiratory System, Student worksheets.

1. Introduction

Biology lessons are lessons that tested rationally and must be given to students who major in science[1]. Biology courses include the study of life, living organisms, structure, function, growth, evolution, distribution, and taxonomy. Biology is a science that studies the life of the world with various aspects, the experience of living things, the environment, and the interaction of living things with the environment. In biology, there are multiple branches of study, one of which is the anatomy and physiology of living things. Living things include humans, animals, and plants, both single-celled and multicellular.

Understanding biology is beneficial for understanding the anatomy and physiology of the human body[2]. For an understanding of the anatomy and physiology of the human body in biological material to be absorbed effectively, it must be supported by the existence of learning media, teaching aids, or teaching materials. Media as a source and learning tool as audio, visual, and audiovisual aids. Apart from learning media, the existence of teaching materials is also very much needed for the effectiveness of students.

Teaching materials are all forms of materials used to help educators or instructors in carrying out learning activities in the classroom. Teaching materials used in the learning process, which are developed according to the needs of educators and students and properly utilized will be one of the

important factors that can improve the quality of learning. Improving the quality of learning is a task that must be carried out by educators[3].

Teaching materials make educators not the only learning resource in the classroom. In this case, the educator acts as a facilitator to direct students in the learning process [4]. In line with other research, which uses the advance organizer learning model innovation on physics learning, the results show that there is an influence of the learning model on students' learning activities and conceptual understanding [5]. So that one of the teaching materials that are still widely used is the Student Worksheet. student worksheets are the result of technology development that is printed in the form of books and contains visual material, Arsyad argues that student worksheets are a hand out that supports students learning directed[6]. Focused learning using student worksheets which can train students to find new things and can also be a handbook for educators in addition to other books.

According to Komalasari, student worksheets is practice questions that are adapted to learning materials arranged in the form of textbooks. Student worksheets as a form of material evaluation tool as well as a learning source, in student worksheets contains summaries[7]. Understanding learning material is the goal of making student worksheets. The purpose of making student worksheets is to facilitate educators in delivering learning material. Learning contains knowledge, attitudes, and skills that students must have in carrying out learning activities[8]. Skills in packaging learning and motivating students can be implemented using student worksheets. The use of student worksheets for educators' answers was not maximal because students were less interested in using student worksheets. One of the reasons why students are less motivated is because the student worksheets is still in printed form, the presentation is in blurred paper, black and white writing. The appearance and presentation of the student worksheets are less attractive, the image misplacement does not match the material, the material is full and solid with very small font size.

Disinterest in learning can be seen from the reactions of all students when educators ask questions from printed student worksheets, students pay less attention and are slow to respond. This results in participants feeling bored and sleepy while learning takes place. According to Hastuti, the use of student worksheets should be a learning activity for students to improve the quality of learning[9]. In line with this, efforts to build basic abilities that must be carried out by students are contained in a set of activities that are in accordance with the student worksheets criteria[10].

Right student worksheets criteria have a title, study instructions, competencies, supporting information such as info, assignments or exercises, work steps, and evaluation. Based on this statement, the researchers analyzed the student worksheets that are still in use today using the 2013 curriculum. The result is that there are still many educators who use student worksheets at the end of learning with tasks that must be done right away, and a short time so that students have difficulty understanding reading and creative thinking skills do not develop. The student worksheets that are presented also has limitations on displays such as images on supporting information that is not colored and the placement of the pictures is wrong, indicators and learning objectives are not formulated, supporting information and the scope of learning that includes material content that looks so full and dense, causing participant activity students are partially low.

The problem of developing students' thinking by using printed student worksheets can overcome the use of facilities from schools. Facilities and infrastructure such as LCD, wifi, and smartphones can be used in the learning process in the classroom. Schools provide space or computer laboratories, but their utilization is still not optimal, especially in biology lessons. The use of computer laboratories is only used in basic computer lessons, so the use of interactive multimedia in biology lessons is minimal. Learning using interactive multimedia can be tutorials in nature, such as giving exercises and repetitions and simulations. It is said to be interactive because it contains active content and experiences interactions with other users who present images, varied writing, animation, and video[6]. So that students' interest in learning and student worksheets can be presented electronically using the Learning Content Development System (LCDS).

LCDS is an accessible, high-quality, interactive creation of online learning content. Learning using LCDS makes it easy for educators to convey interactive learning information directly or indirectly

LCDS is a technology that can be used as an attractive learning medium and increases students' interest in learning. Student worksheets with the use of LCDS becomes the learning support capacity in the classroom. Making student worksheets using LCDS is quite easy, namely by compiling student worksheets with the available content on the LCSS.

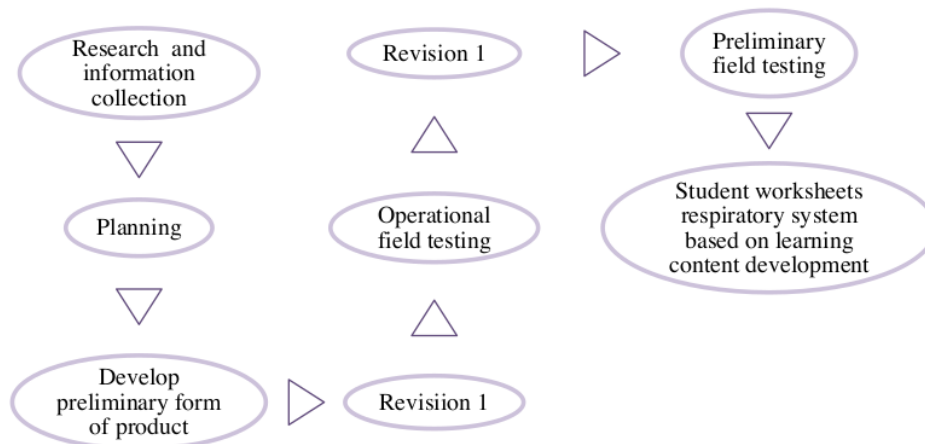
Based on the results of distributing questionnaires to 30 students of class XI MIA 2 MAN 1 Bandar Lampung, it shows that the use of facilities and infrastructure has been used well, except for computer laboratories in biology learning, and students readily absorb material using audio-visual, multimedia media. Interactive. The use of student worksheets for class XI MIA is still in printed form, and 80% of students have problems with the worksheets they have used so far. The expected worksheets are in the way of electronics based on LCDS. Students show enthusiasm by trying the LCDS application firsthand when the researcher introduces it. This is in line with research, which states that there is an effect of using a Learning Content Development System (LCDS) based module on student learning outcomes and knowing students' understanding of concepts after using modules. The results of this study indicate that the LCDS-based module has a significant effect on student learning outcomes [12]. Supported by other research which found that the use of interactive media involving LCDS can motivate students to learn [13].

Given the maximum use of learning facilities, which can affect student interest and learning achievement, researchers are interested in developing LCDS-based worksheets on the respiratory system material to help and motivate students in participating in classroom learning.

2. Methods

This study uses development model from Borg and Gall. The stages are adjusted to the research objectives to produce a product in the form of a feasible LCDS-based worksheet in terms of content and format. So that in this study only carried out up to the seventh stage, namely the main field testing. The research and development steps are described in Figure 1.

Figure 1. The research and development step



Furthermore, the stages carried out in this study began with a preliminary survey. At this stage, the identification of problems in the field was carried out by observing, interviewing, and conducting a need assessment by filling out a questionnaire in MAN 1 Bandar Lampung for class XI MIA students. Besides, literature studies were also carried out to collect material; in this activity, the sub material was the respiratory system. The second stage is planning by preparing the respiratory system material based on the 2013 curriculum from various relevant sources. The third stage is product development; at this

stage, making an student worksheets initial product design. After the initial design of the food product is formed, a validation test is carried out consisting of media experts, material experts, and language experts. After the validation test was carried out, the researcher revised or improved the product according to the input of the experts. Furthermore, a limited product trial was carried out by conducting a small-scale test involving 30 students and a more extensive scale test with a total of 90 students in three high schools located in Bandar Lampung. After a limited trial was carried out, a second improvement was carried out to obtain a product that was suitable for use.

The data collection instrument used consisted of a media expert rating scale, a material rating scale, a user rating scale, and a student worksheets expert rating scale. This scale will measure the acceptance aspects of the respiratory system student worksheets. The data obtained are qualitative and quantitative. Qualitative data is input, comments, and criticism about the developed student worksheets, while quantitative information is the student worksheets assessment score. Quantitative data were analyzed using the calculation of the percentage of relevance items, which would later provide an overview of the agreement between experts and users regarding the developed student worksheets.

3. Result

Student worksheets were developed based on the results of the need assessment conducted by researchers. After finding the need in the field, a literature review on the respiratory system was shown, and a product development product was designed in the form of a student worksheet based on LCDS. This part of the student worksheets includes a homepage which is equipped with a picture showing that the material given is the respiratory system. The next part is a manual that makes it easier for users to use these student worksheets, which are in the form of points that are conveyed very clearly. The next section contains indicators of each respiratory system sub-material that students must master. The next part is the core part, which contains respiratory material, which is equipped with pictures and videos about the respiratory system of humans and animals that make it easier for students to understand the material given. The last part of this student worksheet is a learning evaluation in the form of tasks that must be done by students. The following is an attached part of the developed student worksheets.

Figure 2 an Example of the Material on the Worksheets

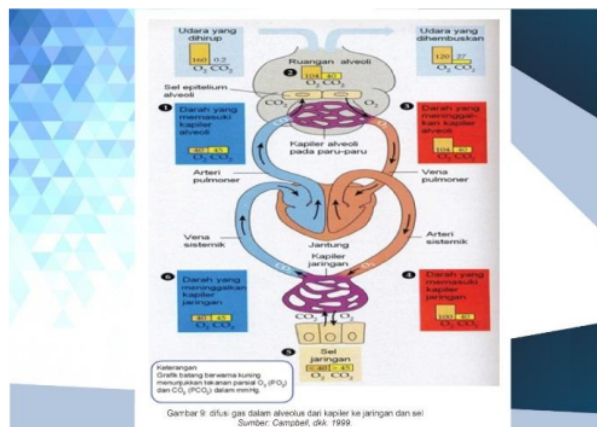


Figure 2 describes the diffusion of gases in the alveoli from the capillaries to tissues and cells. Before being given to the user, an assessment of the content/material and format of the respiratory system student worksheets is assessed by media experts, material experts, and language experts. The results of the assessment are described in table 1.

Table 1. Expert and user test assessment

Expert	Before the Revision	After the Revision	Final criteria
Media	63.23%	85.29%	Very worthy
Theory	61.54%	75%	Well worth it
Language	70.83%	88.89%	Very worthy
Teacher	-	76.75%	Well worth it

In table 1, it is known that the final result of the product assessment, according to media experts, is 85.29%, which falls into the very feasible criteria. The material expert's assessment is 75%, which is in the feasible category. The linguist's assessment was 88.89%, and it was included in the very feasible criteria. This shows that this book fulfills the acceptability aspect so that an assessment is carried out from the user, namely three biology teachers with 76.75% results and is included in the feasible category.

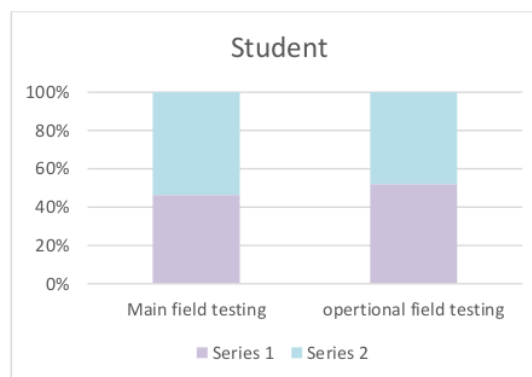
In addition to data in the form of a percentage of eligibility, input from experts was also obtained in the way of information, criticism, and suggestions described in table 2.

Table 2. Revised expert and user ratings

Expert	Input	Revision
Media	Change the design from portrait to landscape orientation	It was changed to landscape with a more attractive appearance and color.
Theory	Match the image to the material	Images in the respiratory system are explained to make it more transparent. The breathing flow is also drawn with a diagram

After assessing and improving the product, a small group is tested for feasibility. The first short group test was conducted on 30 students, and the second small group test was carried out on 90 students. The results of the feasibility test are presented in Figure 2.

Figure 2. Results of student response



17 Based on the results of the small test, it is known that the percentage² obtained is 80.48% in the SL criteria. In the broad-scale test carried out in 3 school places, namely MAN 1 Bandar Lampung, YP UNILA Bandar Lampung SMA, and SMA AL-AZHAR 3 Bandar Lampung, which is as many as 90 students obtained a percentage of 81.45% and⁸ expressed in SL criteria. The purpose of carrying out this small-scale test and the wide-scale test is to¹⁶ determine the feasibility of the LCDS-based student worksheets on the respiratory system material. Based on the results of the response, it can be seen that the LCDS-based Student Worksheet on the Respiratory System Material is stated in the SL criteria to be used in teaching activities.

4. Discussion

The suitability of the resulting product for research and development purposes is presented in a discussion with the revised product. The aim of the researcher in developing this research and development product is to produce an LCDS-based student worksheets in the respiratory system material in a more attractive, comfortable, usefu¹³ and practical way as a learning resource.

The implementation of this research is in MAN 1 Bandar Lampung, YP UNILA SMA Bandar Lampung, and SMA AL-AZHAR 3 Bandar Lampung in class XI IPA students. The model used in the development of Borg and Gall developed by Sugiyono, which consists of 7 stages, namely preliminary studies and literature, planning in research, initial research product design, product testing before revision, product revision, product testing of the initial correction, revision. This statement is similar to research carried out by Leow et al[14].

Products developed can be in the form of teaching materials or media such as interactive multimedia. Learning activities that are used in an optimization manner as a form of information technology are referred to as interactive multimedia[15]. The use of interactive multimedia as a learning activity can make learning directed, effective, and able to improve student learning achievement[16]. One of the interactive multimedia used in this study is student worksheets. The student worksheets developed aims to solve the learning problems of students; the learning base that is deemed appropriate is to use the learning content development system application. According to AREMU Microsoft LCDs, which is software from Microsoft in the publication of electronic learning programs, LCDS is also not too difficult in its use to its users so that it produces customized, high-quality and interactive content that contains quizzes, animations, demos, and other multimedia[17]. Thus it was concluded by Iqbal and Dani in 2013 which stated that LCDS is software that can be accessed online and offline as well as of high quality and interactive, which makes it easy to create learning content[18].

The unique characteristic of this developed product, namely the LCDS-based student worksheets, is easy to use because it can be accessed online and offline, interesting because, in its use, it can combine⁶ deos, animations, images, and evaluation questions in one content. This statement is similar to the research conducted by Yani Suryani et al. that the LCDS-based student worksheets, which is equipped with learning videos, animations, and images, can make students think more thoroughly about the material presented. Students who are enthusiastic and active in digesting the video display or animation shown on student worksheets based LCDS[19]. Furthermore, the research conducted by Luh Sri Asmarani Suradnya stated that with the addition of interactive evaluation questions, students said that it made the LCDS-based student worksheets more enjoyable to use because students could immediately know the answers and scores on questions with a choice of right or wrong answers. Besides, the LCDS-based student worksheets is equipped with the user manual contained on the home page. Therefore it can be used easily by users[20]. In this case, the user referred to by the researcher is a class XI IPA student.

After knowing the character of the student worksheets that will be developed, then the ty⁴ of data to be obtained can be in the form of quantitative data and also qualitative data. This statement is similar to the research conducted by Abdul Ghofur and Rudy Kustijono in 2015[21]. The type of data used is qualitative data, namely, data made descriptively, while quantitative data is data that is made in the form of numbers[22]. Agree with research that has been carried out by Adi Pratomo and Agus Irawan in 2015 that for the manufacture of the instrument used to gain knowledge, namely information in product

development will then be shared with users or respondents[23]. The product eligibility criteria in the form of SL (very feasible), L (feasible), CL (quite feasible), TL (not feasible), and STL (very improper) results were obtained from the validation result data then averaged to get the final result. Furthermore, for the scale that the researcher uses, the Likert scale. Agree with other research which says that the validation instrument is prepared with 4 answer choices, namely: 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree.[24]

To test the feasibility of an LCDS-based student worksheets on respiratory system material, it is first validated by experts. According to Daryanto in the journal Akbar Handoko, the mastery of learned competencies can be done by asking for help from validation experts[25]. Furthermore, the statement by Ismu Fatikhah that validation is based on rational thinking by providing an assessment of the product design being developed[26]. In this study, there were three expert validators, namely material experts, linguists, and media experts. So that the requirements for being used as a validator are undergraduate or postgraduate education in their field as needed.

Data results from the average eligibility obtained in a small scale test, namely with a total of 30 students as respondents from each of the three schools, namely in MAN 1 Bandar Lampung, YP UNILA SMA Bandar Lampung, and SMA AL-AZHAR 3 Bandar Lampung can be obtained. With an average score of 80.48%, this result places LCDS-based student worksheets in the "Very Appropriate" criterion. The trial that was carried out was more extensive, which was followed by students with a total of 90 students, there was an average score of 81.45% with the criteria "Very Feasible". This is better than previous research conducted by Allita Cahyani, I Dewa Putu Nyeneng and Eko Suyanto, who obtained the results of the feasibility of developing LCDS-based teaching materials with the attractiveness, ease, and effectiveness of products as much as 85.29% and students completing KKM after reaching >75%. [27]

In this case, the student worksheets that the researcher developed received a positive response by students as users, including 1) LCDS-based Student worksheets are exciting to use and can provide direct experience to students, 2) students think LCDS-based student worksheets can increase independence in carrying out learning.

Research conducted by researchers from the three high schools in Bandar Lampung received a positive response and was worthy of use. So that in various cases before carrying out this research, researchers sought information from numerous previous studies. The results of prior research developed student worksheets, which showed integration between biological material, especially the respiratory system, with chemicals, especially nicotine, which is found inactive substances in cigarettes. Then other research developed student worksheets with the attractiveness, convenience, usefulness, and effectiveness of the product[28].

Furthermore, other research develops student worksheets with process-oriented skills so that it can be applied in the learning process, describes the implementation of the learning process, the level of readability by students, and can know the completeness of students' learning outcomes after using this student worksheets[29]. Furthermore, other research has also developed LCDS in science studies, which show that the products that are developed are attractive, easy to use, and of great benefit for educators and students[30]. LCDS-based student worksheets on the respiratory system material help students understand learning in the classroom. LCDS is a supporting and interesting capacity when learning in the classroom because of the audio and video elements that can help students visualize the respiratory system material. It can be concluded from the above discussion that in this study, student worksheets can be developed with various innovations as learning materials and media for students.

5. Conclusions

Based on the data from the research and discussion, it can be concluded that the development of worksheets is based on learning content development system (LCDS) with a respiratory system. has the following characteristics: (1) LCDS-based worksheets are easy to use. (2) worksheets based on LCDS is exciting and helps in understanding the material. (3) worksheets based on LCDS is easy to use because there are instructions for use. The results of the assessment by media experts, material experts, and linguists on the LCDS-based worksheets are included in the "Very Appropriate: with an average score

of 85.29%, 75%, and 88.89%. The development of student worksheets based on learning content development system (LCDS) received a response rating of 81.45% with the criteria "Very Appropriate" by student responses, and an assessment of "Feasible" was obtained based on the assessment of biology educators with a percentage of 77.41%.

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