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Module Development on Human Breathing System Materials Based on Moocs for Class VIII Students

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Abstract

Technology has been used to innovate learning in the contemporary educational system. With the use of technology, teachers hope to create a more engaging learning environment and give pupils stimulus so they can comprehend what they are studying. One form of using technology in learning is the use of MOOCs as a learning medium. Therefore, this research aims to develop a MOOCs-based digital module on respiratory system material for grade VIII junior high school students. This research is a Research and Development (RnD) study with the 4D model which is limited to the third D stage which includes the Define, Design, Development stages. The data collection techniques used were observation, interview, and questionnaire. The instruments used in this study were observation sheets, teacher interview guide sheets, expert validation sheets, and student response test sheets. Data analysis techniques were carried out qualitatively and quantitatively. The results showed that the MOOCs-based digital module was very feasible and could be used based on the results of expert validation. The results of the learner response test to the digital module developed showed a very good category. The conclusion from the results of this study shows that the digital module developed was declared feasible by a team of experts and received a positive response from students to be continued in a wide-scale trial to see the effectiveness of the product.

A. Introduction

Technology has been used to innovate learning in the contemporary educational system. With the use of technology, teachers hope to create a more engaging learning environment and give pupils stimulus so they can comprehend what they are studying. Following the gradual decline of the COVID-19 epidemic, a variety of educational resources surfaced that aided in the process of learning. For instance, one such resource was a digital module designed to be accessed via MOOCs (Achya et al., 2022; Perry et al., 2021; Tan et al., 2022). Additionally, as they belong to generation Z, today's pupils are better suited to study through audio-visual media (Nicolaou et al., 2021; Nicolaou & Kalliris, 2020). Science is the study of how to methodically learn about nature and develop ideas that have practical applications (Ismail, 2019). Additionally, it is anticipated that learning with the 2013 curriculum would support students' development of critical and creative thinking as well as problem-solving skills (Novela, 2023).

The use of learning media as a tool to assess the effectiveness of the teaching and learning process appears to play a significant role in teachers' success in the classroom. Learning media not only makes the environment pleasant for students, but it also facilitates the delivery of material by professors and the reception of that material by students. According to Tondeur's opinion in (Lestari, 2018), claims that the use of digital technology in education is currently taking off as a way to enhance learning through informational or instructional tools. Teachers can give students learning opportunities they may not have

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recognized before by using technology in a variety of learning assignments and avoiding certain subject areas.

Any media can be used to facilitate audio-visual learning. Due to the elements of effectiveness, efficiency, and attractiveness offered by technology-based learning. Digital technology is currently the most influential thing in the global education system (Anderson & Rivera-Vargas, 2020). Furthermore, internet networks enable us to learn anywhere, at any time, and with a vast array of resources thanks to the use of technology in education as a middleman to accomplish learning objectives (Hardianti, 2023). One of the audio-visual media that can be operated via the internet is MOOCs or Massive Open Online Courses. According to (Fahmy & Sumner, 2021), depending on the subject matter that students are studying, MOOC implementation typically makes use of video instruction and other learning resources. Interactive learning, or MOOCs, is learning with the use of electronic device support services (El Kabtane et al., 2020; Ho et al., 2022; Oksatianti et al., 2020). Students can access this digital module on the internet. MOOCs consist of creatively and innovatively crafted movies that are presented as modules to help students understand what they are learning. MOOCs deliver its content in the form of modules that need to be completed one at a time, reviewed, and evaluated (Alonso-Mencía et al., 2020; Hamid et al., 2021; Jaelani & Purnamasari, 2021). Especially in the respiratory system material, in this respiratory system material, there are many organs that work in humans.

Good infrastructure, facilities, and human resources for educators all contribute to high-quality education. A developed nation can also be created by the government through the production of a superior generation of people through high-quality education. The process of breathing in and out is known as "inhale and exhale" in the human respiratory system. Based on KD 3.9 on respiratory system material, this respiratory system material's current KD, Students must be able to evaluate and comprehend the content in order to assess the human respiratory system, comprehend respiratory system illnesses, and comprehend actions taken to preserve the health of the respiratory system. In order for pupils to comprehend the information being taught to them about disorders and maintaining the health of the respiratory system, engaging media is necessary. Although some students are able to understand the material by memorization, the majority find it difficult to understand when presented in a traditional manner. This respiratory system material, in particular, contains a lot of biology-related material that requires students to remember everything from organ parts to diseases to how to maintain respiratory health.

Students can be given a realistic representation of the organs that make up the human respiratory system through the use of MOOCs, including the trachea, bronchi, bronchioles, alveoli, larynx, pharynx, and throat (Mufidah, 2022). In line with the opinion according to (Amalia & Suryani H, 2019), the nose, throat, larynx, trachea, bronchi, bronchioles, lungs, and alveoli make up the respiratory system. There are two types of breathing: internal and external, also known as exhale and inhale. Internal breathing occurs when blood in capillaries and all of the body's cells breathe with each other, whereas external breathing is the exchange of air in the alveolus with blood (Putranadi et al., 2021).

Textbooks and LKS are the main teaching resources used in the learning process, according to the findings of observations and an interview with a science teacher of the eighth grade at SMPN 11 Bengkulu City. Eighth grade science teachers have not used digital modules especially those based on MOOCs into their lesson plans. Students have not taken an active role in teaching or learning activities; instead, learning activities are still teacher-centered. Learning activities focus more on discussing the subject matter, and once this is done, students are given tasks to complete in the package book and LKS, which makes it difficult for them to pay attention to the teacher when they are attentively going over the content.

To ensure that students fully comprehend the content related to the respiratory system, a digital module that connects the subject matter to often occurring occurrences in daily life must be developed. In order to help students fully comprehend the content, this MOOCs-based digital module teaching material is anticipated to offer creativity and diversity in engaging and dynamic learning experiences with items portrayed through animations and visuals in the form of videos.

Based on this, the author hopes that the creation of MOOCs-based digital modules for junior high school students in class VIII on respiratory system material can be utilized as extra

B. Research Methods

The research method used in this research is research and development or Research and Development. The Research and Development research method uses the 4D model, according to Thiagarajan in (Fitri et al., 2022), Because the processes in this paradigm are considerably easier to perform practically, the 4D model that is being used has a well-organized and uncomplicated structure. In this 4D paradigm, there are four primary phases: Define or characterize, Design or create, Develop or create, and Disseminate or distribute. However, in this study, it was only completed up to the third D stage, or development. 32 students from SMP Negeri 11 Bengkulu City's class VIII D served as the study's subjects. The following chart displays the steps of the 4D development model.

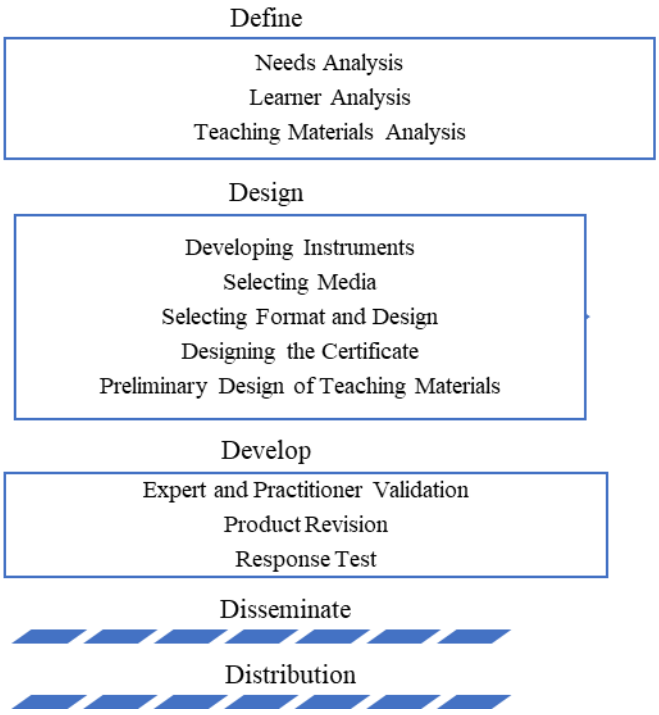

Figure 1. 4D Stage

The research instrument used is by conducting observations, interviews, and distributing questionnaires of students' needs and responses. The following table 1 is a 4D research instrument which is limited to the third D stage, namely Develop.

Tabel 1. 4D Research Instrument

Stage	Target Data	Data Source	Instrument	Analysis
Define	Data on the characteristics of teaching materials used in schools	*Review document*	Document Review Sheet	Descriptive
	Data on the need for digital module development	Teachers and learners	Interview sheet and needs assessment questionnaire	Qualitative, quantitative
Design	Data from the validation of digital module product development design	Supervisor	Digital module design validation sheet	Qualitative, quantitative
Develop	Expert and practitioner validation data on the	Expert lecturers and practitioners	Digital module validation sheet	Qualitative, quantitative

Stage	Target Data	Data Source	Instrument	Analysis
	developed digital module			
	Data from the small-scale usage test of the developed product	Learners	Response sheet for limited product use test	Qualitative, quantitative

The research was conducted from September 26 to November 2, 2023. The data analysis technique used is qualitative and quantitative data analysis. In the data analysis of the validation test of expert lecturers and teachers, with the validity stage carried out by 2 validators and 1 teacher. By using the Likert Scale in table 2 below.

Table 2. Likert Scale Interpretation

Interpretation	Score
Strongly Disagree	1
Disagree	2
Agree	3
Strongly Agree	4

By determining the percentage value of expert validation using the following formula

$$Percentage = \frac{Score\ obtained}{Maximum\ score} \times 100\%$$

And interpreted by looking at the eligibility criteria in table 3 below

Table 3. Criteria for Validation Results

No	Feasibility Index	Category
1.	0% - 25%	Very Unfeasible
2.	26% - 50%	Not Feasible
3.	51% - 75%	Feasible
4.	76% - 100%	Very Feasible

While the analysis of students' responses is carried out using a Likert Scale as in table 4 below

Table 4. Learner Response Assessment Criteria

Interpretation	Score
Strongly Disagree	1
Disagree	2
Agree	3
Strongly Agree	4

Analysis of the questionnaire that has been obtained based on the responses of students is accumulated using the percentage formula as follows

$$Persentage = \frac{Score\ obtained}{Maximum\ Score} \times 100\%$$

The results of these calculations can be used to determine the achievements obtained for the product by interpreting through the following table 5:

Table 5. Interpretation of Learner Response Test Score

No	Feasibility Index	Category
1.	76% - 100%	Very Good
2.	51% - 75%	Good
3.	26% - 50%	Not Good
4.	0% - 25%	Very Bad

The problem restriction in this study is that the product developed is a MOOCs-based digital module which is a website that can be accessed by students freely and the material developed is respiratory system material with consideration of one of the abstract materials that require visualization not only in the form of images.

C. Results and Discussion

The outcomes of this research and development are digital modules for junior high school class VIII respiratory system content that are based on MOOCs. Based on the research methodologies used, the following are the findings of a study on the creation of digital modules for MOOCs.

1. Define

In this defining stage, is the initial stage in this research and development activity which is carried out with the aim of determining the needs and requirements of the development to be carried out. The following is a description of the results of the activities carried out at the defining stage, namely:

a. Needs Analysis

To acquire a general idea of the field conditions, needs analysis is done. During this phase of the needs analysis, research was done on the teaching materials used in the process of teaching and learning activities at SMPN 11 Bengkulu City. Teachers of science subjects were also interviewed and observed in order to determine whether any elements were missing from the development of digital module teaching materials. The research carried out at SMPN 11 Bengkulu City yielded evidence indicating that the instructor had not included digital modules, particularly those based on MOOCs, in the curriculum. Textbooks and LKS are the learning resources that instructors utilize. ln order to ensure that there is no instructional material, such as digital modules, utilized during the learning process that explains concepts pertaining to the respiratory system's principles and processes that cannot be directly observed.

b. Learner Analysis

Learner analysis is carried out with the aim of knowing the interests and problems in learning by using a needs questionnaire and interviews to find out the teaching materials needed by students in the learning process. Which this analysis is the basis for developing digital module teaching materials.

c. Teaching Material Analysis

In line with the 2013 curriculum, an analysis of the teaching materials is done to see whether the goals of the Core Competencies and Basic Competencies have been met. Created indicators can be used to create learning objectives. The material on the respiratory system is known to consist of three KD indicators: first, explaining what breathing is; second, mentioning the respiratory system's organs; and third, analyzing the respiratory system's organs and diseases. This information is based on the analysis of the core competencies and basic competencies of science learning in grade VIII semester two.

2. Design

Researchers put together a digital module framework at the product design stage of the design process, which is where digital module products are designed. This step is completed after the data from the Define stage is collected, allowing the product to be designed based on the needs of the pupils. The product—digital modules based on MOOCs—will be developed. The first display, the material display, and the material and video display comprise the three divisions of the digital module structure. A home display featuring the title of the material, cover elements, progress, a synopsis of the subject, topics for discussion, and quizzes can be found in the first display section. A list of the items to be discussed per point is included in the material display area along with quizzes, progress, and material names. Conversely, the quizzes and materials discussed are in the material display area alongside the movie. Development, subject titles, and instructional videos. Bandicam video capturing and a typeface size range of 15–40 are used in the genial design of this digital module. The digital module of MOOCs that will be developed as a product design is shown in Figure 2-4 below.

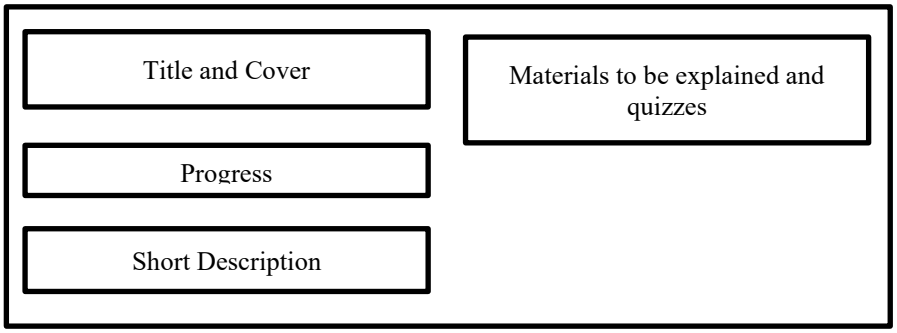

Figure 2. Initial Display

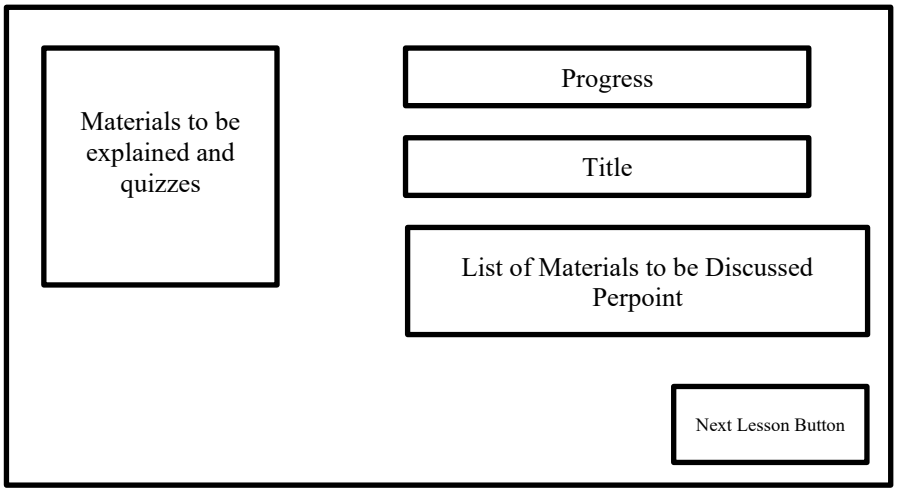

Figure 3. Material Display

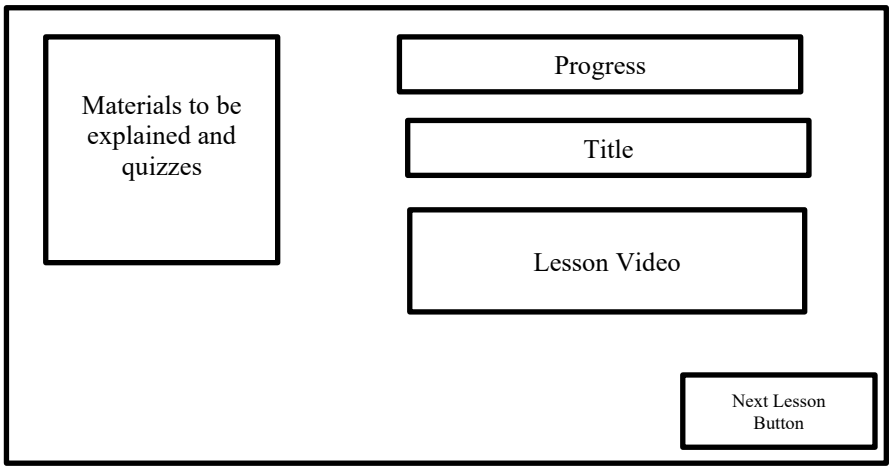

Figure 4. Material and Video Display

3. Development

After the design stage of the MOOCs-based digital module on respiratory system material, the next stage is the development of digital modules which are then validated by experts. The digital module that has been developed will be validated by three validators. The assessment consists of four aspects, namely aspects of material content, presentation, language, and appearance of teaching materials. The MOOC-based digital module products that have been developed can be seen in Figure 5-7 below.

Figure 5. Initial Display

In the initial appearance of this module there is a material title and cover that contains a large title on the digital module, besides that there is progress on the material, showing how far the students have completed the material calculated in percentage form, then there is a brief description of the respiratory system material and there is material to be discussed and quizzes.

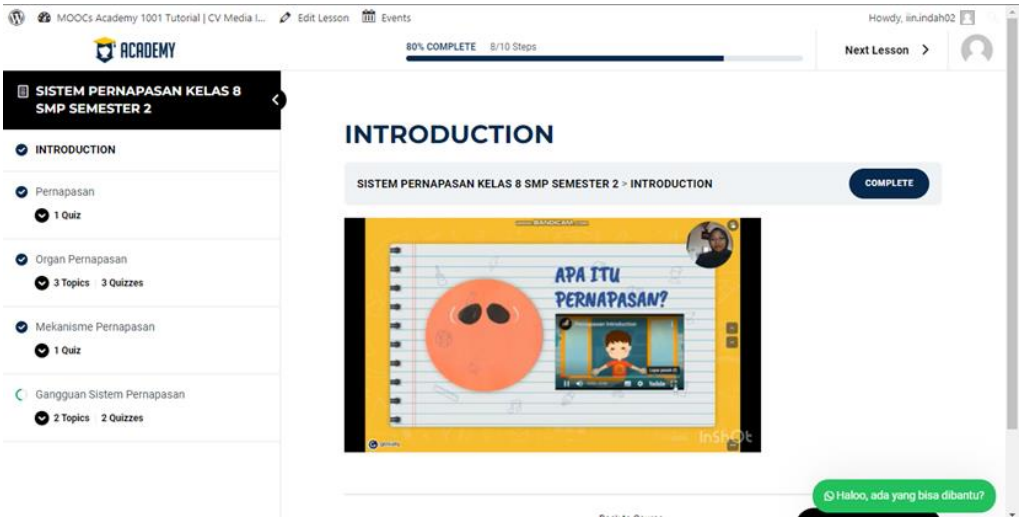

Figure 6. Material Display

In the material display section of this developed digital module contains materials that will be discussed and quizzes, there is progress on material titles, and a list of materials that will be discussed per point.

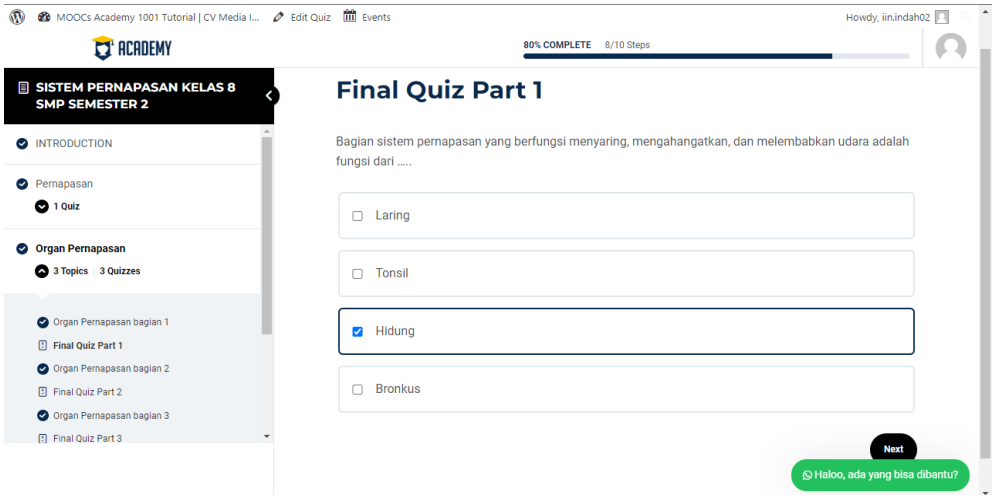

Figure 7. Material and Video Display

To access the next section, students must complete the development in the closing section by taking the final quiz. If the final quiz is not completed and the results are still inappropriate or fall short of the required value, students will need to retake the questions until they achieve the desired result.

The teaching material, which takes the form of a MOOCs-based digital module, is known to be in the very feasible category based on the findings of an expert validity test. The percentages of the teaching material's content, presentation, language, and display aspects are 95.8%, 91.6%, and 93.7%, respectively. Based on these three factors, it can be said that the digital module teaching materials' validation test results, which were carried out by three validators, meet the highly feasible criteria, with an average final result of 94%. This demonstrates that the digital module teaching materials have satiated the requirements for material, media, and language feasibility. More specific results from the experts' validation examination of the MOOCs-based digital module on respiratory system content may be found in the following table 6

Table 6. Feasibility Test Results

No.	Aspect	Percentage	Description
1	Content	95,8%	Very Feasible
2	Presentation	91,6%	Very Feasible
3	Language	87,5%	Very Feasible
4	Display	93,7%	Very Feasible
Average Percentage		**94%**	**Very Feasible**

The created MOOCs-based digital module is meant to provide as an alternate source of instruction for students studying topics related to the respiratory system. Due to the fact that, according to the findings of observations, teachers continue to utilize LKS teaching materials and printed books, which discourage pupils from being engaged in the subject matter. Particularly in content where the teacher mostly uses torsos and photos to illustrate concepts like respiratory organs and how the respiratory process works. in order for pupils to lack enthusiasm for their studies in the classroom.

According to the opinion, the MOOCs-based digital module is a type of collection of instructional materials that are arranged both methodically and aesthetically, with the goal of enabling students to learn on their own. The materials include methods, material content, and independent evaluations (Suryani et al., 2020). This MOOCs-based digital module has advantages specifically freely available resources that are accessible from anywhere at any time and may be utilized on computers or mobile phones.

The purpose of the response test is to evaluate the digital module's suitability for usage as an additional teaching tool during the learning process. According to (Mawarni et al., 2022), in addition to assessing the suitability of the language used and the ease with which the writing can be read, the response test is helpful in determining how easily students can understand vocabulary, sentences, paragraphs, and interviews as well as in giving them instructions on how to complete their learning tasks. Students in SMPN 11 Bengkulu City's class VIII D administered the response test. According to the assessment of respondents, the purpose of the response test was to ascertain the degree of response to the digital module (Mawarni et al., 2022). Said (Mawarni et al., 2022), in addition to assessing the suitability of the language used and the ease with which the writing can be read, the response test is helpful in determining how easily students can understand

vocabulary, sentences, paragraphs, and interviews as well as in giving them instructions on how to complete their learning tasks. The findings of the response test that was administered fall into the very good category, with 84% of the outcomes. The results obtained indicate that the response rate of the digital module is good. Three aspects were tested in the learner response test: the aspect of interest received an 83%, which is in the very good category. This figure indicates that the MOOCs-based module has five indicators in this aspect: (1) the MOOCs video is attractive at first glance; (2) the lettering is appropriate and easy to read; (3) the video's color scheme is intriguing; (4) the content is clear and interesting when presented with a combination of images and videos; and (5) the digital module is easily accessible. In accordance with (Suryani et al., 2020) opinion Students' interest in the learning process can be increased by creating engaging and enjoyable modules. The results gained in the material aspect were 83%, which is considered extremely good. Four indicators point to this aspect: (1) the digital module's explanation of the respiratory system material is clearer and easier to understand; (2) the digital module's explanation of the respiratory system concept is easily understood; (3) the respiratory system explanation through videos helps students understand more about the material; and (4) the videos and materials are presented in a way that makes them relatable to everyday life. Like the opinion expressed by (Suryani et al., 2020), said that learning can use digital modules to increase students' learning activities well, the existing material can train students to think critically, and the presence of audio and video videos helps students understand the material. And in the language aspect, the results obtained 86%, of which there are two indicators, namely (1) the sentences used in the digital module are concise, clear, and easy to read and (2) the language used in this digital module is standard language according to PUEBI which is easy to understand. In line with the opinion of (Hanatan et al., 2023), Given that the media utilized in interactively presented teaching materials adheres to visual communication, it can be argued that the development of educational resources is conceivable. According to (Nazara et al., 2022), that someone can respond to an object if the object is able to attract attention. Supported by the opinion of (Prihatiningtyas & Sholihah, 2020), He claimed that the interactive teaching resources were well received since they were utilized because they were engaging and facilitated users' learning of the subject matter. The responses that students have provided on the questionnaires fall into the "very good" category. This is because the digital modules have been developed using language appropriate for junior high school students in grade VIII, as well as an appealing overall design. The digital module in this study was rated as having a good response level category, meaning that students can easily read and understand it.

The response test comprises aspects that are indicative of MOOCs-based digital modules in general, such as conveniently accessible font and color selection, well-presented words in straightforward English. The digital module has a decent response rate, as indicated by the results. It is imperative that educational resources are aesthetically pleasing to students, preferably accessible over the internet. In addition, according to (Megantari et al., 2021), The use of proper colors that blend in with the image and background can make the display more engaging and aid teachers in explaining abstract learning information in a way that students can grasp. The display should also have a clear voice and music playing in the background.

The students' response to the product response experiment demonstrated a very good response to the assessment components of interest, substance, and language, according to the research data. Table 7 below shows the outcomes of the product response test.

Table 7. Percentage Results of Product Response Test

Aspect	Average (%)	Criteria
Interest Material Language	84%	Very Good

Easy-to-access digital modules play a critical role in assisting students in comprehending the principles of the content taught, enabling them to formulate assertions and assemble evidence to support them. Certain elements of the response test provide clues as to how quickly MOOCs-based digital modules can be accessible overall. These include clear language and words given, accurate color and font selection, and accuracy in color selection. Based on the results, it can be concluded that digital modules have a high response rate because the instructional materials are created with an eye toward making them as visually appealing as possible and easily accessible over the internet. In accordance with the opinion of (Herlika & Suhono, 2023) which says that technological advances and digitalization have affected the way students learn and changed market demands.

In order to determine whether this digital module can have an impact, more study on MOOCs-based digital modules pertaining to this respiratory system material is required. This research can be tested utilizing quasi-experiments.

D. Conclusion

Experts on MOOCs-based digital modules covering the respiratory system have validated the material, and the results show that the overall average value is 94% or very feasible, with percentages of 95.8% for material content aspects, 91.6% for presentation aspects, 87.5% for language aspects, and 93.7% for display aspects. The MOOCs-based digital module on respiratory system material is in the extremely viable category, according to the results.

With an 84% score in the very good category, the student response test results for the MOOCs-based digital module on respiratory system content indicate that the product generated was deemed very good by the students.

E. Acknowledgement

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References

Achya, R. S., Inggi, R., & Bakrim, L. O. (2022). Perancangan Dan Implementasi Aplikasi Massive Open Online Course (MOOC) Modul Certificate Dan Ceremony. *Simkom*, *7*(1), 50–62. https://doi.org/10.51717/simkom.v7i1.75

Alonso-Mencía, M. E., Alario-Hoyos, C., Maldonado-Mahauad, J., Estévez-Ayres, I., Pérez-Sanagustín, M., & Delgado Kloos, C. (2020). Self-regulated learning in MOOCs: lessons learned from a literature review. *Educational Review*, *72*(3), 319–345. https://doi.org/10.1080/00131911.2019.1566208

Amalia, E. L., & Suryani H, D. (2019). Augmented Reality untuk Sistem Pernafasan pada Manusia. *SMARTICS Journal*, *5*(2), 55–59. https://doi.org/10.21067/smartics.v5i2.3390

Anderson, T., & Rivera-Vargas, P. (2020). A critical look at educational technology from a distance education perspective. *Digital Education Review*, *37*, 208–229. https://doi.org/10.1344/DER.2020.37.208-229

El Kabtane, H., El Adnani, M., Sadgal, M., & Mourdi, Y. (2020). Virtual reality and augmented reality at the service of increasing interactivity in MOOCs. *Education and Information Technologies*, *25*(4), 2871–2897. https://doi.org/10.1007/s10639-019-10054-w

Fahmy, A. M., & Sumner, T. (2021). Reflections on The Last Decade of Mooc Research. *Computer Applications in Engineering Education*, *29*(4), 648–665. https://doi.org/10.1002/cae.22334

Fitri, A., Efriyanti, L., & Silmi, R. (2022). Pengembangan Modul Ajar Digital Informatika Jaringan Komputer dan Internet Menggunakan Canva. *Jurnal Mahasiswa Teknik Informatika*, *7*(1), 33–38. https://doi.org/10.36040/jati.v7i1.5999

Hamid, S. N. M., Lee, T. T., Taha, H., Rahim, N. A., & Sharif, A. M. (2021). E-Content Module For Chemistry Massive Open Online Course (Mooc): Development And Students' Perceptions. *Journal of Technology and Science Education*, *11*(1), 67–92. https://doi.org/10.3926/jotse.1074

Hanatan, R. B., Yuniastuti, E., & Prayitno, B. A. (2023). Pengembangan Modul Digital Interaktif Berbasis Discovery Learning untuk Meningkatkan Minat Belajar Siswa. *Jurnal Teknodik*, *27*(1), 81–98. https://doi.org/10.32550/teknodik.vi.862

Hardianti, E. W. (2023). Analysis of the Needs for Development of Kahoot Game-Based Learning Media. *IJOEM: Indonesian Journal of E-Learning and Multimedia*, *2*(2), 66–72. https://doi.org/10.58723/ijoem.v2i2.187

Herlika, & Suhono, B. (2023). The Development of Interactive Multimedia Virtual Laboratory to Enhance Students ' Academic Achievement. *Indonesian Journal of E-Learning and Multimedia*, *2*(3), 96–103. https://doi.org/10.58723/ijoem.v2i3.143

Ho, N. T. T., Pham, H. H., Sivapalan, S., & Dinh, V. H. (2022). The adoption of blended learning using Coursera MOOCs: A case study in a Vietnamese higher education institution. *Australasian Journal of Educational Technology*, *38*(6), 121–138. https://doi.org/10.14742/ajet.7671

Ismail, I. (2019). Upaya Meningkatkan Pemahaman Organ Pernapasan Manusia Melalui Implementasi Model Demonstrasi pada SD Negeri 5 Teunom. *Jurnal Serambi Akademica*, *7*(4), 453–462. https://doi.org/10.32672/jsa.v7i2

Jaelani, A., & Purnamasari, I. (2021). Analisa Pemilihan Kursus Daring Pada Karyawan PT. Gramedia Asri Media dengan Metode Analytical Hierarchy Process. *Jurnal Sains Komputer & Informatika (J-SAKTI)*, *5*(2), 736–745. https://doi.org/10.30645/j-sakti.v5i2.372

Lestari, S. (2018). Peran Teknologi dalam Pendidikan di Era Globalisasi. *Edureligia; Jurnal Pendidikan Agama Islam*, *2*(2), 94–100. https://doi.org/10.33650/edureligia.v2i2.459

Mawarni, H., Sholahuddin, A., & Badruzsaufari, B. (2022). Validitas Modul Interaktif Pembelajaran IPA untuk Meningkatkan Kemampuan Berpikir Kreatif. *Wahana-Bio: Jurnal Biologi Dan Pembelajarannya*, *14*(1), 54-64. https://doi.org/10.20527/wb.v14i1.13662

Megantari, K., Margunayasa, I. G., & Agustiana, I. G. (2021). Belajar Sumber Daya Alam Melalui Media Komik Digital. *MIMBAR PGSD Undiksha*, *9*(1), 139–149. https://doi.org/10.23887/jjpgsd.v9i1.34251

Mufidah, L. (2022). Validitas Media Pembelajaran Berbasis Web pada Materi Sistem Pernapasan Manusia Kelas VIII di SMP. *Bioeduca : Journal of Biology Education*, *4*(1), 57–66. https://doi.org/10.21580/bioeduca.v4i1.10851

Nazara, A. W., Halang, B., & Rezeki, A. (2022). Respon Siswa Terhadap Modul Elektronik Subkonsep Sistem Peredaran Darah Manusia Berbasis Problem Based Learning. *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, *6*(2), 3804–3811. https://doi.org/10.58258/jisip.v6i2.2978

Nicolaou, C., & Kalliris, G. (2020). Audiovisual media communications in adult education: The case of cyprus and greece of adults as adult learners. *European Journal of Investigation in Health, Psychology and Education*, *10*(4), 967–994. https://doi.org/10.3390/ejihpe10040069

Nicolaou, C., Matsiola, M., Karypidou, C., Podara, A., Kotsakis, R., & Kalliris, G. (2021). Media Studies, Audiovisual Media Communications, and Generations: The Case of Budding Journalists in Radio Courses in Greece. *Journalism and Media*, *2*(2), 155–192. https://doi.org/10.3390/journalmedia2020010

Novela, E. (2023). Analysis of Learning Media Development Needs Exe Learning Straight Motion Material Changes Regularly for Senior High School Class XI. *Indonesian Journal of E-Learning and Multimedia*, *2*(3), 104–109. https://doi.org/10.58723/ijoem.v2i3.199

Oksatianti, B. R., Risdianto, E., & Mayub, A. (2020). Pengembangan Pembelajaran Daring Berbasis Moocs Untuk Meningkatkan Motivasi Belajar Siswa Pada Materi Suhu dan Kalor. *Jurnal Ilmu Dan Pembelajaran Fisika*, *1*(2), 174–181. https://doi.org/10.33369/ajipf.1.2.174-181

Perry, T., Findon, M., & Cordingley, P. (2021). Remote and blended teacher education: A rapid review. *Education Sciences*, *11*(8), 1–42. https://doi.org/10.3390/educsci11080453

Prihatiningtyas, S., & Sholihah, F. N. (2020). Jurnal Pendidikan Fisika Universitas Muhammadiyah Makassar Project Based Learning E-Module to Teach Straight-Motion Material for Prospective Physics Teachers. *Jurnal Pendidikan Fisika Universitas Muhammadiyah Makassar*, *8*(3), 224–233. https://doi.org/10.26618/jpf.v8i3.3442

Putranadi, K., Wahyuni, D. S., & Agustini, K. (2021). Pengembangan Media Pembelajaran Struktur Pernapasan Dan Ekskresi Manusia Untuk Kelas Xi Ipa Di Sma Negeri 2 Singaraja. *Kumpulan Artikel Mahasiswa Pendidikan Teknik Informatika (KARMAPATI)*, *10*(3), 300–310. https://doi.org/10.23887/karmapati.v10i3.36773

Suryani, K., Utami, I. S., Khairudin, K., Ariska, A., & Rahmadani, A. F. (2020). Pengembangan Modul Digital berbasis STEM menggunakan Aplikasi 3D FlipBook pada Mata Kuliah Sistem Operasi. *Mimbar Ilmu*, *25*(3), 358–367. https://doi.org/10.23887/mi.v25i3.28702

Tan, S., Rudolph, J., Crawford, J., & Butler-Henderson, K. (2022). Emergency remote teaching or andragogical innovation? Higher education in Singapore during the COVID-19 pandemic. *Journal of Applied Learning and Teaching*, *5*(1), 64–80. https://doi.org/10.37074/jalt.2022.5.s1.8