Biosfer: Jurnal Pendidikan Biologi

The development of rubi web (rumah biologi web) in biodiversity concept

Mahrawi*, Indria Wahyuni, Dwi Ratnasari, Ika Rifqiawati, Yunvida Istiana

Biology Education, Faculty of Teacher Training and Education, University of Sultan Ageng Tirtayasa, Indonesia

*Corresponding author: dwiratnasari@untirta.ac.id

A B S T R A C T

This study aims to develop a web-based learning media, namely RUBI WEB (Rumah Biologi Web) in the concept of biodiversity. The research method used in this research is a modified development research method from Borg & Gall (2003) whose stages consist of information gathering, planning, product development, and initial field trials. Aspects of the assessment of the material assessed include aspects of material and aspects of language, then aspects of media assessment that are assessed include aspects of software engineering, aspects of instructional design, and aspects of visual communication. The results of the material feasibility test by material experts obtained a percentage value of 80% and media feasibility tests by media experts obtained a percentage value of 83.4%. The results of the user response test by students obtained a percentage value of 86. Therefore, it can be interpreted that the RUBI WEB website learning media in the concept of biodiversity is included in the grade A+ category with a range of percentile ratings between 96-100%, best imaginable adjectives category, acceptable level of acceptance, and NPS (Net Promotore Score) in class promoter, i.e. users are satisfied and loyal to RUBI WEB media, so that they can make users want to recommend this media to others

INTRODUCTION

Widespread technological developments eventually gave rise to various innovations to improve the quality of the learning process. Currently, the learning process is no longer only filled with activities to listen to the teacher's explanation of the material, but students can also do other things in order to be actively involved, for example, students can make observations from various sources, so that the subject can be digested better. The development of existing technology has now finally allowed the presence of an electronic-based learning process called e-learning. This concept called e-learning has the effect of transforming learning into digital form in terms of content and systems. One of the media developed with the concept of e-learning is a website. The use of website media is an innovation that can contribute greatly to changes in teaching and learning activities (Januarisman & Ghufron, 2016).

Website development can make it easier for students to capture further material, because this website can be used by students to look back at notes from learning that have been given by the teacher. The existence of this media can certainly help educators and students to streamline the teaching and learning process. In addition, the use of the website can also make it easier for students to access the material, considering that the website can be accessed through various types of gadgets, one of which is simply using a cellphone. These advantages finally make website development feel necessary to improve the quality of the learning process (Mutia & Leonard, 2013).

In this study, the development of this website will be filled with biodiversity concept in KD 3.2 and 4.2 grade 10 High School. This KD was chosen because Biodiversity in Biology subjects is considered as material that requires mastery of many concepts because the scope of the material is quite wide (Ramadan, 2012). Biological diversity is a term used to describe the abundance of various forms of life on earth, which is indicated by the presence of unicellular organisms to higher-level organisms. The scope in this biodiversity consists of diversity in an environment (ecosystem), diversity in a species (type) and diversity in genetic level (Siboro, 2019). In addition, observations of needs that have been carried out at Senior High School 4 of Serang City showed results, that is, as many as 33.9% of students chose Biodiversity as a difficult concept to understand because of the wide scope of the material. In addition, the teacher of class X (ten) also stated that the material that is considered difficult for 10th grade is Biodiversity. In fact, biodiversity is an important resource in national development because of its advantages that can be utilized sustainably. Thus, the process of delivering Biodiversity concept is considered to require the selection of the right media so that the interests of students can be withdrawn and their learning motivation can be grown to learn the material presented (Laraswaty, 2017).

The development of the website on the Biodiversity concept was chosen because with the existence of a website, the fairly extensive Biodiversity concept can be delivered in an easier and more flexible way, because students can access it anywhere and anytime (Cholid et al., 2016). Based on the observation answers, students and teachers agreed with the development of the website as a medium to support learning activities for Biodiversity concept. This is because Senior High School 4 of Serang City already has adequate facilities to support the development of e-learning by allowing the use of mobile phones during the teaching and learning process and the availability of Wi-Fi facilities that are free to be used by all students, especially due to the emergence of the pandemic period, schools and students are required to be able to adapt to the use of technology for distance learning. However, the problem is that in practice to get appropriate and quality media to use, educators often find it difficult (Widiasari, 2021).

The development of learning media for this website-based Biodiversity concept is expected to be a solution for educators who have difficulty getting media that is appropriate, effective and easy to use, so that its use can produce positive results so that the activities and results of teaching and learning activities in students are better. The development of the website as a medium for learning Biology has also been previously carried out and has provided good results, namely with the increase in student learning outcomes. Therefore, researchers believe that development research with the title "Development of Web Rubi (Web Biology House) in the Concept of Biodiversity" needs to be carried out to help the process of teaching and learning activities (Safira et al., 2018).

Based on what has been previously explained, the purpose of this study is to develop RUBI Web (Rumah Biologi Web) as a learning medium that is suitable for use to help the learning process in the concept of biodiversity. The next objective is to determine the feasibility of RUBI Web in the concept of biodiversity as a learning medium. The last objective is to determine the feasibility of RUBI Web in the concept of biodiversity based on limited-scale tests as a learning medium.

METHODS
Research Design
This research was carried out in January-June 2022, with details of activities that included collection of observational data on needs in January at Senior High School 4 of Serang City. After that, it continued with the development of the website, Media Feasibility Test and Material Feasibility Test in February-April at Sultan Ageng Tirtayasa University, then Limited Scale Test in May-June at Senior High School 4 of Serang City. Research on the development of RuBi Web (Rumah Biologi Web) in the concept of Biodiversity is a type of Research and Development (R&D) research developed by Borg & Gall (2003), which has been modified so that it consists of four stages, information collection, planning, product development, and initial field trials (user response tests).

Population and Samples
This development research involves experts in the development of website media on the concept of Biodiversity, namely each a material expert and media expert related to Biology concept who is a lecturer at University of Sultan Ageng Tirtayasa, and 20 respondents of students from 10th grade of Senior High School 4 of Serang City.

Instrument
The data in this study were obtained using non-test techniques for data collection techniques. The data taken came from the results of observations of needs, media assessments by experts, and user response tests in a limited-scale test at Senior High School 4 of Serang City, Indonesia. The source of media feasibility analysis data is obtained by conducting an assessment by a team of experts (material experts and media experts), as well as respondents (students).

The instruments used in this study consisted of three types of questionnaires, namely an observation of needs sheets, which were distributed to teachers and students, media assessment sheets for material and media experts, and user response sheets processed with the System Usability Scale (SUS).

Procedure
Based on the model developed by Gall, et al (2003), there are ten stages that must be carried out in conducting development research. However, in this development research, researchers carried out restrictions. the research and development: information collection stage, planning stage, product development stage, with the following research design in Figure 1.
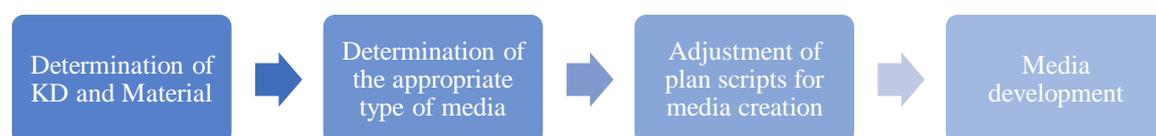

Figure 1. Steps in Product Development

The first step taken in developing this product is determining KD and materials to suit the curriculum. The material for the development of this media is Biodiversity found in KD 3.2 and 4.2 grade 10 High School. Second, the appropriate media type is determined. Determination of the type of media is based on the results of the observation of the needs obtained. Third, drafting a media creation plan. This manuscript contains detailed material which will later become the content of the media being developed. Fourth, create media that can be used to assist the learning process for students.

Data Analysis Techniques

The data obtained from the questionnaire is then processed in its presentation on a likert scale. The scale is structured in the form of a statement with five grading scales. The results of this data analysis became the basis for revision for media development. The answer can be rated in Table 1.

Table1

Assessment Score against Answer Choices.

Qualitative Value	Score
Excellent	5
Good	4
Fair	3
Poor	2
Very Poor	1

The total score obtained is further calculated using the formula: $PS\ (\%) = \frac{R}{MS}\ x\ 100\%$ with PS (%): Percentage of respondents answers, R: Number of scores obtained, MS: Highest number of scores, and 100: Percentage provisions (Sugiyono, 2014). To assess the quality and level of feasibility of the final product based on user responses, the results of the assessment score are then converted into an assessment statement by calculating their average results.

Table 2

Eligibility Criteria.

Value Range (%)	Interpretation Results
P > 80%	Very Feasible
61% < P ≤ 80%	Eligible
41% < P ≤ 60%	Enough
20% < P ≤ 40%	Less Feasible
P ≤ 20%	Not Worth

[Pratama, 2017]

The data obtained from the results of the distribution of the response test sheet to respondents was then processed to obtain a score of SUS results by reducing the score on the odd numbered statement with the number 1 and subtracting the number 5 with the score obtained in the even numbered statement, then summing the score results obtained with the number 2.5. The results that have been obtained are then calculated on average by dividing the score by the number of respondents so that the SUS score results are obtained. To interpret the results of the SUS score, there are five ways that can be used, namely based on the interpretation of the comparison of percentiles, rankings, traits, acceptance rates, and NPS from the SUS score results themselves (Kesuma, 2021). The scale of interpretation of SUS score results can be seen in Figure 2.
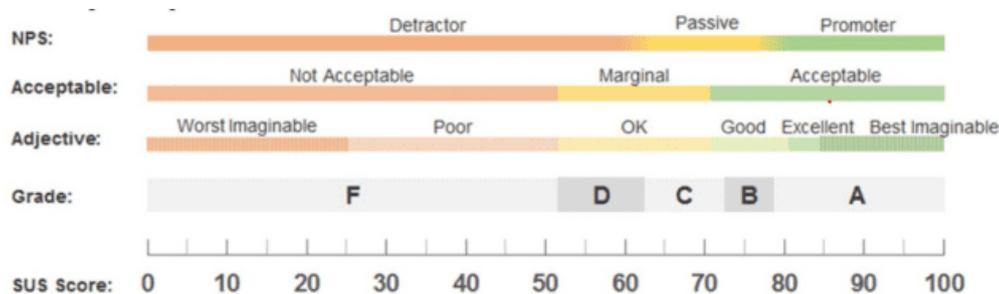

Figure 2. Sus score interpretation categories

Questions from the System Usability Scale (SUS) can be seen in table

Table 3
System Usability Scale (SUS) Questions.

No.	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	I think I would like to use this website often					
2	I think this website is too complicated					
3	I think this website is easy to use					
4	I think I need the help of technicians to be able to use this website					
5	I found various functions in this website that are well integrated					
6	I think there are too many inconsistencies in this website					
7	I imagine, many people will very quickly learn this website					
8	I find this website very difficult to use					
9	I am very confident using this website					
10	I need to learn a lot of things before using this website					

Source: (Sauro, 2011)

RESULTS AND DISCUSSION

The research on the development of Rumah Biologi Web uses a development model developed by Borg & Gall with modified stages, namely: information collection, planning, product development, and initial field trials. The results of the observation of needs show that the school has implemented the 2013 curriculum and already has adequate resources for the implementation of electronic learning, then teachers have never used the website as a learning media in the classroom. In addition, the teacher just uses the diversity of plants in the school environment, several illustrative images, and videos to support learning on biodiversity concept as a learning media. Thus, the development of a website on biodiversity concept can be a potential in research because it has never been done.

In the second stage, namely material collection, the first step in developing learning media is to collect materials to support the development of the website as a learning media. This material consists of website materials (as the content of the learning material and illustrations), and tools (for website development).

In the third stage, namely product design and development, the development of RuBi Web began to be carried out by determining KD and materials, determining the type of media accordingly, adjusting the manuscript of the media creation plan, and finally making interesting media. In the first stage, KD and material are determined in accordance with the learning that applies in schools, so that the media developed in the future is in accordance with the needs of educators and students. The material chosen in the development of this media is the concept in KD 3.2 and 4.2 in the 10th grade of high school. Second, the determination of the appropriate type of media is based on the results of the observation of the needs obtained, namely in the form of a website. Third, in preparing the manuscript of the media creation plan, researchers collect material details from various sources which will later become the content of the developed media. Fourth, create an interesting website to help students learning activities. The stages carried out in the product development process in this study: preparing domains and hosting, logging in client areas and installing WordPress, setting up WordPress, and publishing material content through WordPress. When preparing a domain and hosting, the step taken is to visit the hosting provider to get the hosting and domain address (Rahman, 2020). The next step after successfully obtaining the domain and hosting address is to login the client area via the link provided via e-mail by the hosting provider. After logging in, we will be directed to install WordPress. This installation is done by setting the login username and password in the WordPress account. After successful installation, a message will appear in the form of a website address and a login link to the admin dashboard on WordPress. After that, we will go directly to the dashboard page, this is where all the features that WordPress provides can be set to match the website you want to develop. Through the

dashboard we can change themes, configurations, publish and organize content, add plugins, and so on (Mubarok, 2020). The next step is to publish material content by writing or moving the manuscript that has been created to the post page on WordPress. When editing content, we can add plugins directly from the post page. The use of plugins can be adjusted to the needs of the content on the post page. This plugin can be in the form of media links, such as calendars and clocks, audio, or other post page links. After completing the content by writing material and adding media, we can carry out the publication process by pressing the publish button at the top of the post page. After the publication is carried out, we can access the content on the website through various devices connected to the internet by visiting the domain page that has been prepared, namely *rumahbiologi.id.*

There are two main pages on this website: Home and Blog. By pressing the "Start Learning" button on the page of the website, users can go directly to the first learning material post. After studying the learning material in the first post, users will be directed to go to the second post and so on in a row by pressing the material title button located at the bottom of each post page, so that users can study the material in sequence. Then on the Blog page, users can select a list of materials they want to study by pressing the title of each material. In addition, users can also go directly to the needed page by pressing the navigation button located at the top of each post. The appearance of the RUBI web (*Rumah Biologi* Web) can be seen in Figure 3 and Figure 4.
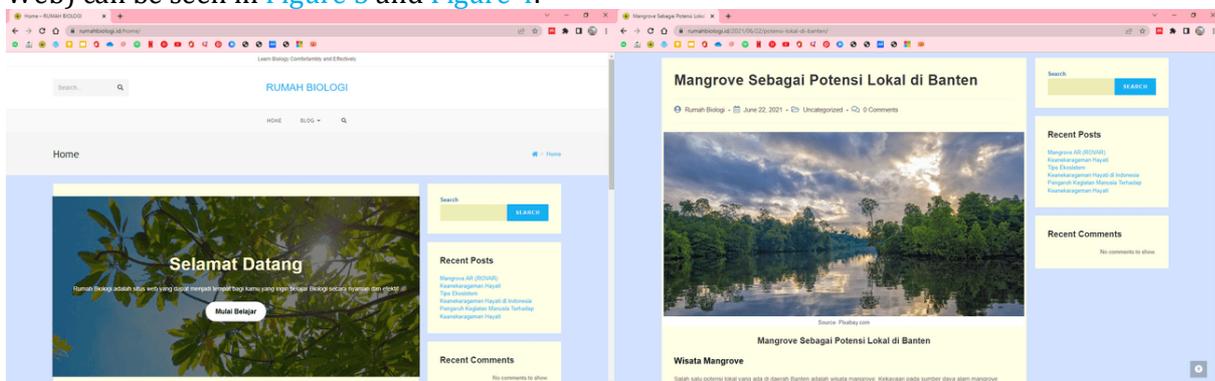

Figure 3. RUBI Web (Rumah Biologi Web) display on dekstop site.
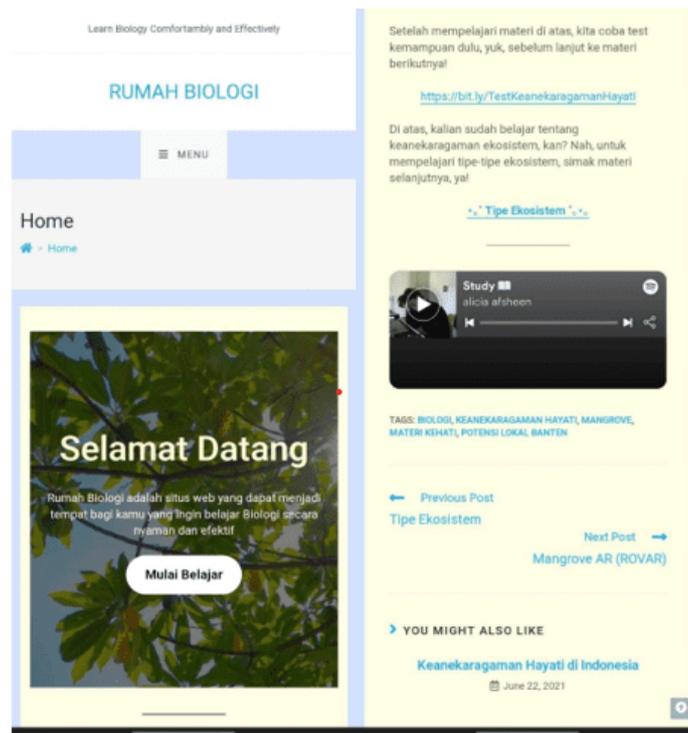

Figure 4. RUBI Web (Rumah Biologi Web) display on mobile phone.

The fourth stage, which is the testing stage by experts, namely material experts and media experts. Material experts have a role in assessing material aspects, whose indicators are in the form of

the suitability of the material with the curriculum, clarity of the material displayed, the level of difficulty of the material, material actualization, material accuracy, and material exactness, then linguistic aspects whose indicators are in the form of language communication, and the accuracy of terms. Media experts have a role in assessing aspects of software engineering whose indicators are in the form of the effectiveness and efficiency of resource use, media realibility, media compatibility, media completeness, and media use, then instructional aspects whose indicators are in the form of learning objectives, media application, material presentation, and material evaluation, then lastly aspects of visual communication whose indicators are communicative, creativity, audio, visual, animation, and buttons. The results of the instrument feasibility test by the material expert on each indicator are obtained to determine the feasibility of the material in the RuBi Web media. The existing indicators present every aspect of material feasibility on the RuBi Web media, namely material and linguistic aspects. The percentage values of the two aspects are shown in Figure 5.
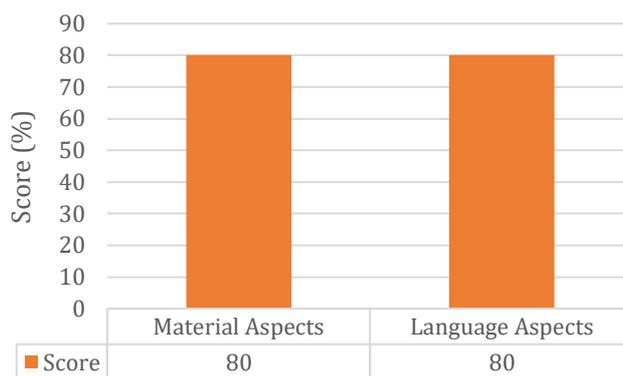

	Material Aspects	Language Aspects
Score	80	80

Figure 5. The results of feasibility tests by material experts on all aspects

The overall material feasibility test showed the results that this website-based learning media was in a good category with a percentage value of 80%. The suitability of the material with the curriculum, the clarity of the material displayed, the level of difficulty of the material, the actualization of the material, the accuracy of the material, and the exactness of the material in the material aspect each get a value of 4 so that the material aspect gets a percentage value of 80%, then the linguistic aspect whose indicators are in the form of language communication, and the accuracy of the term also gets a value of 4 with good interpretation so that the linguistic aspect also gets a percentage value of 80%. All indicators on the learning media assessment instrument for material experts get a score of 4, so it can be seen that all indicators are rated good. Thus, the results of the feasibility test material on The RuBi Web media can be interpreted eligible. The feasibility test score of the material on the indicators can be seen in Figure 6.
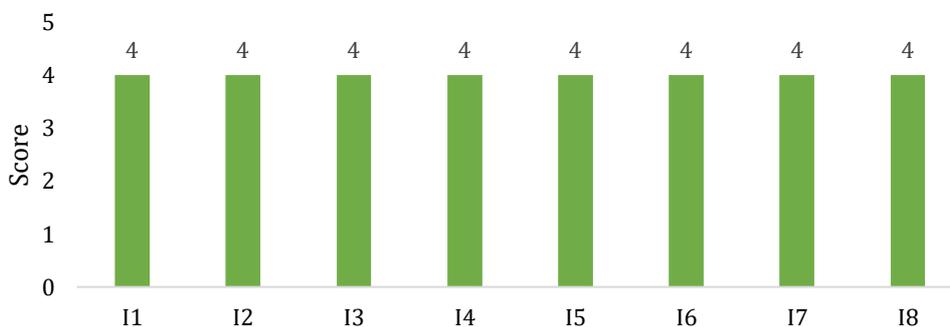
Information:
I: Indicators
I1: Conformity of The Material with The Curriculum
I2: Clarity of The Material Displayed
I3: Material Difficulty Level
I4: Material Actualization
I5: Material Accuracy
I6: Material Exactness

I7: Language Communication
I8: Accuracy of Terms
Figure 6. Material feasibility test scores on the basis of indicators

Comments and suggestions given by material experts are the need for a review of the material in the media and the addition of material illustrations so that students do not have difficulty understanding the content of the material. In addition, it is necessary to carry out revisions to correct typos in the manuscript of the material. Thus, this RuBi Web learning media is eligible for use in research with several revisions.

The results of the media feasibility test showed that this RuBi Web learning media received a score with a very good description with a total percentage value of 83.4%. These results are obtained by observing every aspect to find out the feasibility of RuBi Web media. There are three aspects in the media feasibility test of this RuBi Web, namely aspects of software engineering, istructional design, and visual communication. The percentage values of the three aspects are shown in Figure 7.

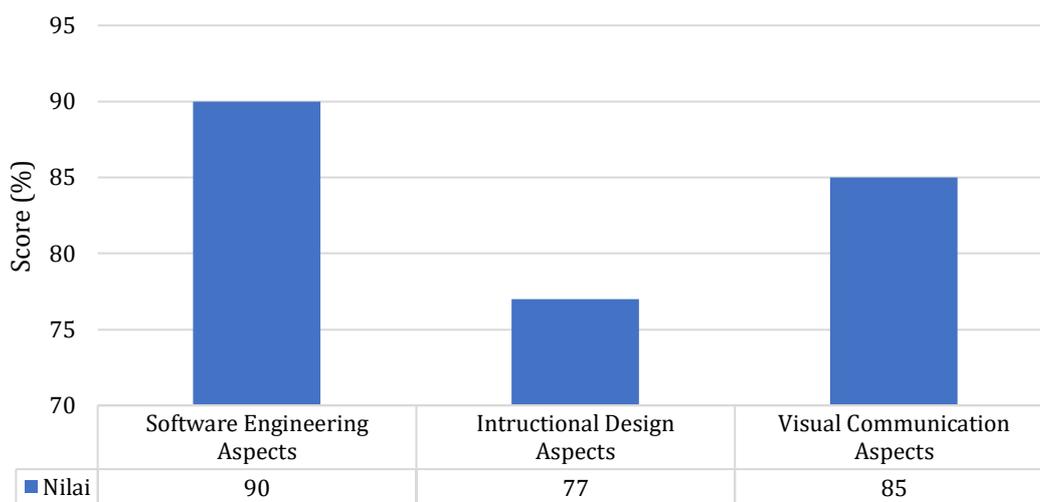|	Software Engineering Aspects	Intructional Design Aspects	Visual Communication Aspects
■ Nilai	90	77	85

Figure 7. The results of due diligence by media experts on all aspects

Each aspect contains indicators to find out the feasibility of media on Rubi Web media. The software engineering aspect, which consists of indicators of the effectiveness and efficiency of resource use, media reliability, media compatibility, media completeness, and media use, obtained a percentage value of 90% in an excellent category, then the instructional design aspect, which consists of indicators of learning objectives, media application, material presentation, and material evaluation, obtained a percentage value of 77% in a good category, and aspects of visual communication, consisting of communicative indicators, creativity, audio, visual, animation, and buttons, got a percentage of 85.4% in an excellent category. The media feasibility test scores on each indicator can be seen in Figure 8.

Information:
I: Indicators
I1: Indicators of Effectiveness and efficiency of resource use
I2: Media realibility
I3: Media Compatibility
I4: Completeness of the media
I5: Use of media
I6: Learning objectives
I7: Media Application
I8: Presentation of material
I9: Material evaluation
I10: Communicative
I11: Creativity
I12: Audio
I13: Visual
I14: Animation
I15: Buttons

Figure 8. Media feasibility test scores on each indicator

As a result, this RuBi Web (Web Biology House) learning media is eligible of use in research with several revisions. Comments and suggestions obtained from media experts, that is, on the media website there is already consistency in clarifying the important parts with bold features, but in the media it is still necessary to add questions that can provoke readers to think further and consciously to maintain biodiversity, an exclamation to protect biodiversity at the end of each material, and the impact that can be felt directly from human activities on biodiversity.

Based on the average results obtained from the validation results by material and media experts with a percentage value of 81.7%, the RuBi Web learning media is in the category of very feasible for use as a learning media. After getting the judgment, the step taken is to improve the media by revising it. This process is carried out in the fifth stage, namely the revision of learning media. Various comments and suggestions obtained from material experts and media experts, then used as a reference for improvement to the deficiencies found in the developed RuBi Web (Web Biology House) media.

The sixth stage, which is testing the user's response to the media. The revised RuBi Web Media was then used to the final stage of the study, namely the limited-scale test stage as a learning media at Senior High School 4 of Serang City by involving 20 students from the 10th grade as respondents. The collection of responses from students as users of website-based learning media is carried out after students are directed to try using RuBi Web Media.

Based on the SUS media assessment for respondents, an SUS score of 86 was obtained. As a result, RuBi Web media is included in the A+ grade category with a percentile rating between 96% and 100%. In addition, RuBi Web media is categorized with an adjective that is in the best imaginable category, acceptable, and NPS in the promoter levels, that is to say users feel satisfied when using the product as far as the user will recommend the product to others. The scale of interpretation as the results of the SUS score of RuBi Web can be seen in Figure 9.
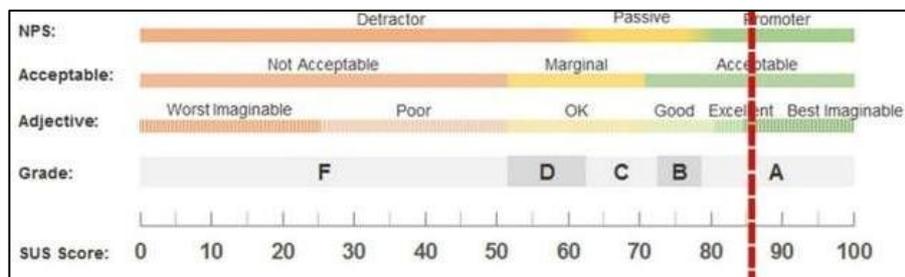
Figure 9. Test results of user response to media

Accordingly, it can be interpreted that students receive well-developed media so that this media can be used to help the learning process in the classroom for biodiversity concept. This is closely related to the expansion of information and communication technology in the world of education so that there

is a shift in learning that originally only ran conventionally to be more open towards the use of diverse media (Iskandar, 2019). Therefore, the development of the website as a learning media will help teachers and students to be able to carry out teaching and learning activities more effectively in accordance with technological advances, because with the website we can access and get various information through additional images, photos, audio, and video (Syaiful et al., 2014). These results are accordance with research which reveals that the use of websites helps students to more easily access material, considering that websites can be accessed through various types of gadgets (Mutia, 2013).

With the development of RuBi Web in the concept of biodiversity, students can not only carry out learning activities while at school, but also can access the material concepts that have been or will be discussed in their respective homes through various types of devices they have, be it using smart phones, laptops, tablets, or computers, as long as the devices used are connected to the internet network. The use of this website media can finally make learning activities feel more enjoyable, more efficient, and also more practical for students (Simamora, 2019). This is in accordance with research which states that with the development of the website, the learning material can be delivered in an easier and more flexible way, because students can access it anywhere and anytime (Cholid et al., 2016). In addition to being a learning media that is easy to be used, the development of RuBi Web media in the concept of biodiversity is also expected to foster a spirit of environmental care and conservation attitudes for students, considering that Indonesia is a megabiodiversity country blessed with abundant natural wealth and has such a high level of ecological and organism endemism (Agung, 2019).

CONCLUSION

The development of RuBi Web in the concept of biodiversity is carried out with several stages, which begin with the information collection stage, followed by the planning stage, product development stage, and initial field trials to find out user responses. The development of this website-based media is carried out using hardware, in the form of laptops, computers, and mobile phones, and software, in the form of chrome and ms. word applications. The results of the material expert test showed a percentage value of 80% and the media expert test results of 83.4%. The results of the user response test showed a score of 86 which means that this media is included in the grade A + category, the percentile rating reach is between 96-100kes%, the best imaginable adjectives category, the acceptance rate is acceptable, and the NPS in the promoter class, that is to say users are satisfied and loyal to RuBi Web media, so that it can make users want to recommend this media to others.

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