Developing Wetland Contextual Interactive Learning Media on Numbers Using Drill and Practice Method

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Abstract

Textbooks used in schools today are available in both print and digital versions. The use of the digital version is not much different from the printed version, which is accessed page by page. The more technology develops, the more learning facilities and infrastructure are developed. Currently the availability of interactive technology that allows students and books to interact with each other. Interactive books can be designed to respond to student activities as a teacher responds to students. The purpose of this study was to develop interactive media on number material for class VII students with a drill and practice approach. The content of teaching materials has wetland content, including information on fruits, fish and handicrafts. This interactive media was developed using HTML, CSS, Javascript, Scratch, Mathjax, JSON, and Firebase technologies. The learning approach uses the drill and practice method. This interactive media was tested to organize online learning during the Covid-19 pandemic. Based on the results of the study, it was found that student learning outcomes showed the overall average score was above the KKM of the subjects, namely the average value of learning outcomes was 75.80 from the KKM of 75.00. The results of teacher and student responses showed a positive response to the developed interactive media.

Keywords: Interactive Learning, Numbers, Wetland, Drill and Practice Method

Abstrak

Buku teks yang digunakan di sekolah saat ini tersedia dalam versi cetak dan digital. Penggunaan versi digital tidak jauh berbeda dengan versi cetak yang diakses halaman demi halaman. Semakin berkembangnya teknologi maka semakin banyak pula sarana dan prasarana pembelajaran yang dikembangkan. Saat ini tersedianya teknologi interaktif yang memungkinkan siswa dan buku saling berinteraksi. Buku interaktif dapat dirancang untuk merespon aktivitas siswa sebagaimana guru merespon siswa. Tujuan penelitian ini adalah mengembangkan media interaktif materi bilangan untuk siswa kelas VII dengan pendekatan drill and practice. Isi bahan ajar memiliki konten berkaitan dengan lahan basah, antara lain informasi tentang buah-buahan, ikan dan kerajinan tangan. Media interaktif ini dikembangkan dengan menggunakan teknologi HTML, CSS, Javascript, Scratch, Mathjax, JSON, dan Firebase. Pendekatan pembelajaran menggunakan metode drill and practice. Media interaktif ini diujicobakan untuk menyelenggarakan pembelajaran online di masa pandemi Covid-19. Berdasarkan hasil penelitian diketahui bahwa hasil belajar siswa menunjukkan nilai rata-rata keseluruhan berada di atas KKM mata pelajaran yaitu nilai rata-rata hasil belajar a dalah 75,80 dari KKM sebesar 75,00. Hasil respon guru dan siswa menunjukkan respon positif terhadap media interaktif yang dikembangkan.

Kata kunci: Pembelajaran Interaktif, Materi Bilangan, Lahan Basah, Metode Drill and practice

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INTRODUCTION

In the realm of education, technological advancements can be a source of rejuvenation. This is supported by the development of textbooks that were previously printed and converted into digital form that can be read on computers. The digital version, on the other hand, is used in a similar way as the print edition, which is viewed page by page. However, it is not simply for converting physical

books to digital books. The use of electronic instructional resources is quickly expanding. The demand for teaching resources that are not just text-based drives the development of interactive multimedia learning media (Dewi, Murtinugraha, & Arthur, 2018).

Interactive multimedia is a combination of images, video, animation, sound and games (Almara'beh, Amer, & Sulieman, 2015; Iskandar, Rizal, Kurniasih, Sutiksno, & Purnomo, 2018; Setiawan, Isnaeni, Budijantoro, & Marianti, 2015; Malalina & Kesumawati, 2014; Kinasih & Hardiani, 2020) in one software that allows users to interact directly (Novitasari, 2016). Educators must make maximum and judicious use of the growth of learning multimedia. Learning media is essential in the classroom. Learning media serves two purposes: as teaching aids and as learning tools. Drill and practice is employed as a technique of providing content in the created interactive learning in this study. Students are guided through activities to enhance dexterity and fluency in a skill using the drill and practice technique. To be effective, drill and practice methods must include feedback to reinforce correct answers and correct errors that students may make when applying the method. Interactive quizzes with drill and practice methods can improve student learning outcomes (Adiwisastra, 2015; Zainuddin, Shujahat, Haruna, & Chu, 2020; Machmudah, Rosyidi, Haris, Kasem, & Nurcholis, 2021; Morawo, Sun, & Lowden, 2020), help improve basic skills (Lehtinen, Hannula-Sormunen, McMullen, & Gruber, 2017), and improve cognitive function (Prikken, Konings, Lei, Bagemann, & Sommer, 2019).

When it comes to arithmetic lessons that contain counting, the drill and practice technique is suitable. Mathematics learning is the process of giving students with learning experiences via a sequence of organized activities in order for them to develop competency in the mathematical content being studied. Understanding what students know and need to learn, as well as challenging and helping them to learn it successfully, is required for innovative mathematics learning (Tilaar, 2010).

One of the subjects in mathematics class VII Senior High School (henceforth SMP) which has been difficult for students to learn is integers. Figure 1 presents the results of the 2018/2019 National Examination in State Junior High Schools/MTs throughout the Province of South Kalimantan (Kalsel) and throughout the Regency of Banjarmasin). It presents the results of the percentage of students who correctly answered math problems at the district level in several discussion categories, including numbers 38.88%, algebra 48.12%, geometry and measurement 43.96%; and statistics and 55.37% probability.
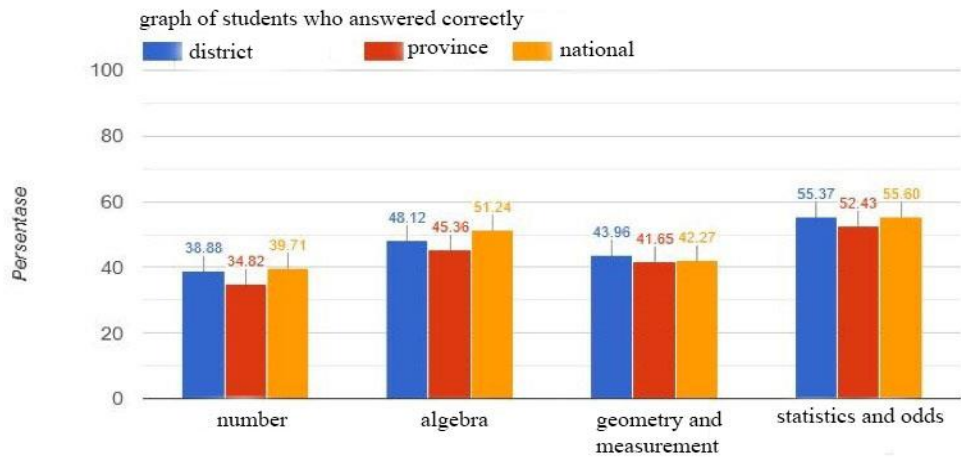
Figure 1. Results of the 2018/2019 national examination in state junior high schools/MTs

From these results, it is known that the number material is the lowest percentage of truth. Therefore, one way to improve student learning outcomes on integer material is to use interactive multimedia. Learning using interactive multimedia has many benefits, such as being able to facilitate students' understanding of concepts (Novialdi & Thahir, 2020), helping in the learning process (Rohdiani & Rakhmawati, 2017), is effective if the average student exceeds the KKM (Chabib, Djatmatika, & Kuswandi, 2017), and increasing students' enthusiasm for learning (Putri, Maizora, & Susanta, 2018). Electronic-based interactive multimedia has been widely developed by educational practitioners. One example is interactive books.

Interactive books are a technology that uses computers to display multimedia information in a concise and dynamic form. Interactive books are able to integrate sound shows, text, images, graphics, animations, to movies so that the information conveyed is richer than conventional books (Triyono, 2012). Interactive books are possible to be viewed on a variety of devices, including PCs, laptops, tablets, and smartphones, making them convenient to store. Interactive books have become increasingly popular as the internet has grown in popularity since they can be viewed at any time and from any location. As a result, interactive books can give learning resources for students and teachers all across the world, supporting online learning, which is now being aided by the COVID-19 pandemic. This will make it easier for teachers to do learning because it is not limited in time. Interactive book facilities that can display information in the form of audio, visual and can interact with users can be a solution for teachers to make learning more interactive so that they can attract interest in learning and improve student learning outcomes.

Wetland environmental insight is an understanding to empower an environment or area that is partially or completely inundated by a shallow layer of water. Wetlands are areas of brackish, swamp, peat or water, whether natural or artificial, permanent or temporary, with flowing or still water, fresh, brackish, or salty, including areas with seawater whose depth is at high tide. Low tide does not exceed

6 meters Wetlands are areas of swamp, peatland, brackish, and water (Iriani et al., 2019). Wetlands have many advantages and benefits for the surrounding community. Knowledge of wetlands is important in regional development. People living in wetland areas want an understanding of wetlands, both in formal and non-formal education (Ibrahim, Aminudin, & Young, 2012). Therefore, in this study, an interactive book for class VII junior high school using the drill and practice learning method needs to be developed so that students are more skilled in understanding the material and in the interactive book with wetland content. Besides learning the number material, students also learn the context of the wetland.

METHODS

This research used Research and Development (R&D) method. R&D is a method used to produce products and test their effectiveness. The development model used in this research is ADDIE (Analysis, Design, Development, Implementation and Evaluation). There are several reasons why ADDIE is still relevant to use. The first reason is that the ADDIE model is a flexible model that can adapt to a variety of situations, allowing it to be utilized today. This paradigm has a lot of versatility when it comes to solving difficulties. The ADDIE model is a useful model to employ, despite its large degree of flexibility, and many people are familiar with the ADDIE acronym. ADDIE also provides a structured general framework for the construction of instructional interventions, as well as their evaluation and revision at each level (Angko, 2013). The development steps can be seen in Figure 2. The research subjects were 27 students of class VII-H of SMPN 2 Banjarmasin and 2 mathematics teachers. The location for the application of the interactive learning material for class VII in the context of a wetland with "drill and practice" was held at SMPN 2 Banjarmasin. The data analysis technique used for this research is descriptive and inferential statistical analysis. The material validation was done by the material experts, and the media validation was done by the media experts.
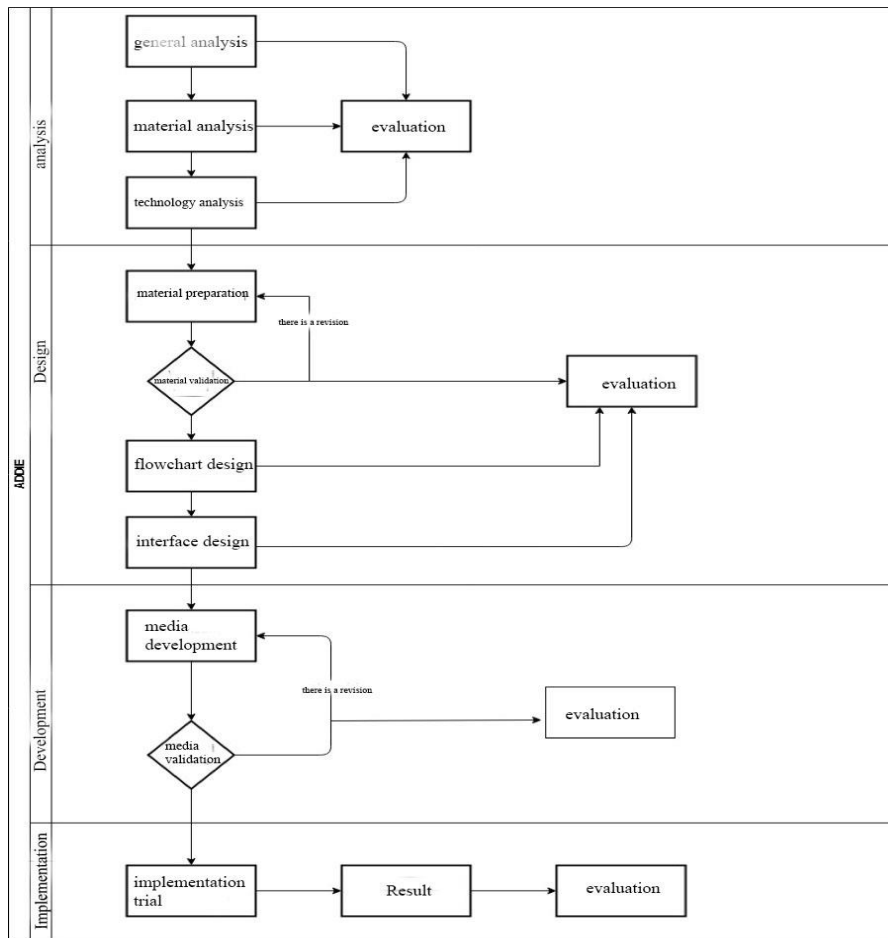
Figure 2. Development flowchart

RESULT AND DISCUSSION

The interactive media developed consists of 3 main menus (Figure 3), namely the Core Competence or *Kompetensi Inti* (henceforth KI) & Basic Competence or *Kompetensi Dasar* (henceforth KD) menu containing core and basic competencies of the material presented. The material menu consists of a collection of materials and quizzes, and the last is the info menu. Figure 3 shows the learning media that has been developed, consisting of 3 columns, each of which contains navigation, content / materials and demonstrations (containing simulations, videos or images).
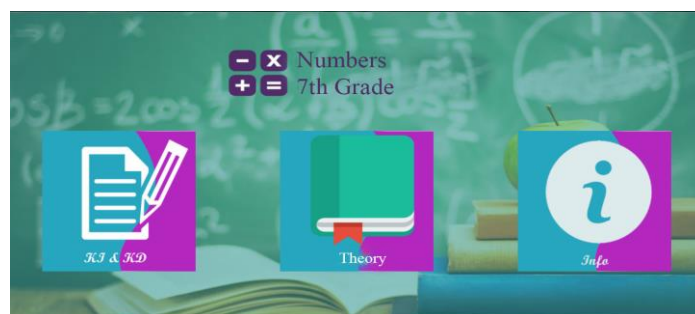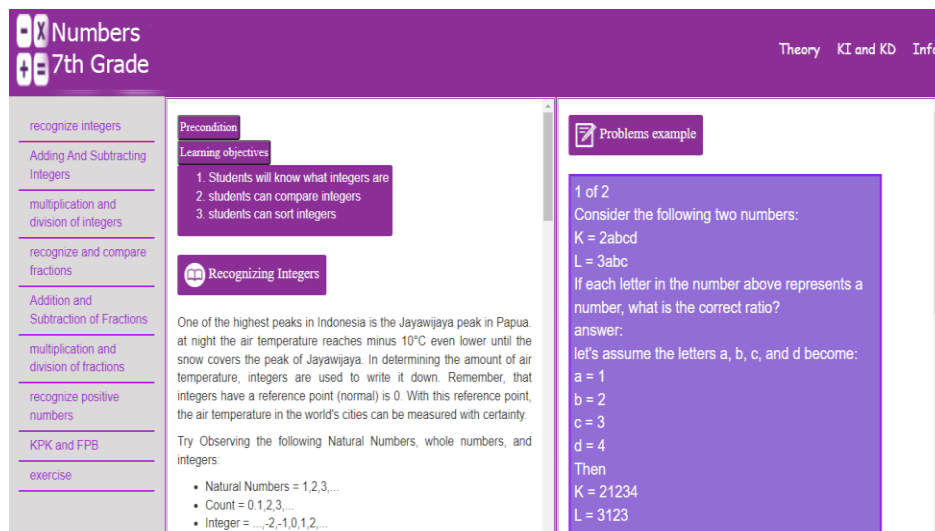

Figure 3. Main page

Figure 4. Display of interactive material

After the user learns the material presented on interactive media, the user can take quizzes and exercises as shown in Figure 5.
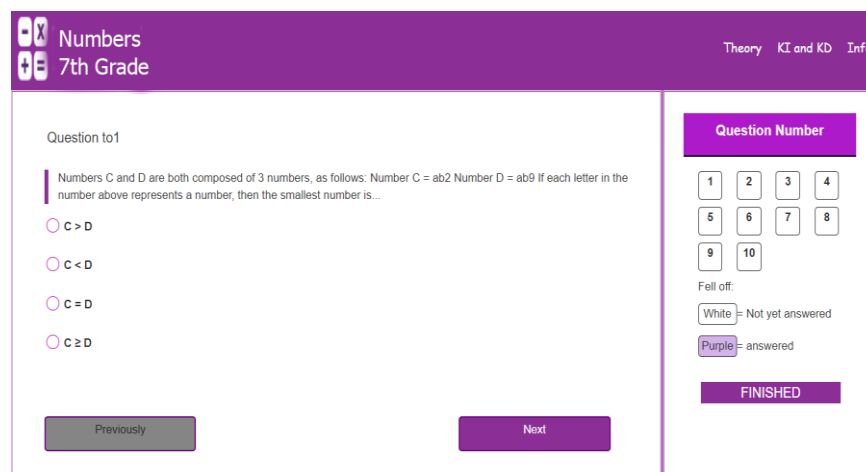

Figure 5. Quiz and practice display

Interactive Media Validity Results

Material validation for interactive learning media consisting of 3 aspects and validated by 2 material experts with the highest score for each item is 4. Furthermore, the material and media are said to be valid if the score for each aspect has a high and very high Achievement Percentage (AP) as shown in Table 1.

Table 1. Criteria for the validity of materials and media

Achievement Percentage (AP)	Criteria
PA ≤ 25	Low
26 < PA ≤ 50	Medium
51 < PA ≤ 75	High
76 < PA ≤ 100	Very High

Based on the results of the validity of the material experts, it shows that the percentage of content, presentation and language achievement is above 90% as shown in Table 2.

Table 2. Material validation results

Aspect	ES	AS		AP
		Validator 1	Validator 2	
Contents	56	23	28	91.1
Presentation	40	18	20	95.0
Language	40	17	20	92.5
Total	136	58	68	92.6
Note: ES= Expected Score; AS = Achievement Score; AP = Achievement Percentage				

Based on the material validity criteria table, the interactive learning material is included in the very high category so that the material can be used as the content of the developed media. Based on media validation from media experts, 87.5% results were obtained for "feedback and adaptation" and "presentation design" as shown in Table 2.

Table 3. Media Validation Results

Aspect	SH	SC		PC
		Validator 1	Validator 2	
feedback and adaptation	8	3	4	87.5
presentation design	56	20	21	73.2
interaction usability	24	10	11	87.5
total	88	33	36	78.4

Referring to Table 3, based on the findings of the validation by media specialists. The quality of the media's feasibility is included in the "very high" category, according to the findings of the data from the validation of two media experts.

Interactive multimedia practicality

The try out was carried out at SMPN 2 Banjarmasin. The number of students who participated as many as 19 people is seen in Table 4.

Table 4. Student learning outcomes

No	Subject	Class	Scores
1	S-1	7H	35
2	S-2	7H	50
3	S-3	7H	55
4	S-4	7H	55
5	S-5	7H	60
6	S-6	7H	60
7	S-7	7H	75
8	S-8	7H	75
9	S-9	7H	80
10	S-10	7H	85
11	S-11	7H	85
12	S-12	7H	85
13	S-13	7H	85
14	S-14	7H	90
15	S-15	7H	90
16	S-16	7H	90
17	S-17	7H	90
18	S-18	7H	95
19	S-19	7H	95
Average			75.8

Table 4 shows that the average student value is 75.8, indicating that the average value above the school KKM is 75. Because some students fail to attain the KKM as a result of poor test accuracy, the learning results can be deduced that the learning medium created is successful. Then, to assess the usefulness of the media generated, students and instructors fill out a response questionnaire about the usage of learning media. Table 5 shows the outcomes of the student replies.

Table 5. Student response results

No	Persentase				Total
	STS	TS	S	SS	
1	1%	24%	52%	23%	100%
2	3%	28%	53%	16%	100%
3	2%	26%	54%	19%	100%
4	2%	5%	48%	46%	100%
5	2%	15%	51%	31%	100%
6	8%	18%	60%	14%	100%
Total	2%	19%	52%	26%	100%
Modus			Agree		

Table 5 demonstrates that the resulting mode is agreeable. Table 5 shows the outcomes of the teacher's answer.

Table 6. Teacher response results

No	Persentase				Total
	STS	TS	S	SS	
1	0%	0%	50%	50%	100%
2	0%	0%	29%	71%	100%
3	0%	0%	56%	44%	100%
4	0%	0%	0%	100%	100%
5	0%	0%	20%	80%	100%
6	0%	0%	0%	100%	100%
total	0%	0%	30%	70%	100%
Modus			Strongly agree		

As can be seen in Table 6, the obtained mode is Strongly agree. The findings of the teacher and student response indicate that the media produced had a positive response; the student and teacher responses indicated that the media was used by teachers and students.

The average validity criteria in this study was very high, with a total percentage of 92.6 for material validation and 78 for media validation, according to the results of validation by material experts and media experts. This is also in line with Setyadi & Qohar (2017)'s findings, which state that learning material is classed as legitimate if it satisfies specified criteria.

The findings of teacher and student assessments are used to determine the feasibility of a product.

The reaction is positive if the teacher's response and that of the dominating students concur. In this study, the results of student responses showed the mode of assessment Agree (S) which means that the answer was dominant on a scale of 3, so that the student's response to the learning media was positive. The results of the teacher's response showing the mode of strongly agree (SS), so that the teacher's response to the learning media is positive.

According to Nuryadi (2018), the efficacy of a product is determined by student learning mastery; learning is considered complete when at least 75% of the total number of students in the learning process receive a KKM score. The percentage of graduation attained by 19 students who completed the evaluation in this study was 79 percent, indicating that the percentage of completion was greater than 75 percent. This is in line with Nuryadi's (2018) research, which claims that the efficacy of a product is judged by the outcomes of student-led testing. If the test findings are noteworthy, or if the score attained demonstrates a minimum percentage of completeness of 75%. As a result, the drill and practice approach used in web-based interactive learning media for class VII junior high school has been determined to be successful. It can be concluded that using drill and practice methods with web-based interactive learning media on class VII content is feasible and can be employed in the learning process.

CONCLUSION

The validation of the content yielded a score of 92.6 percent, indicating a very high degree of validation, with the Validation Value of interactive learning media at 78.4 percent. The degree of validation is rather high. The degree of practicality of web-based interactive learning media has an agreed-upon mode, thus the level of practicality can be said to be practical, and the level of effectiveness can be said to be effective if students study the media from start to finish. So that web-based interactive learning media on class VII junior high school with drill and practice techniques have been evaluated for validity, practicability, and effectiveness, and are appropriate for use in the classroom. So that web-based interactive learning media on class VII junior high school with drill and practice techniques have been evaluated for validity, practicability, and effectiveness, as well as are suitable for use in the learning process.

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