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Development of Interactive Learning Media Capinus Air Science Lessons Water Cycle Topics

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Abstract: Researcher observations were carried out at SD Negeri Beringin 02, which showed that there were problems related to science education content, including limited learning media and low student learning outcomes. The researcher aims to develop, and test the feasibility and test effectiveness of the Capinus Air learning media, namely Canva-based learning media for science lesson content, with the hope of improving the learning outcomes of class V students at SD Negeri Beringin 02, Central Java, especially in the science subject Water Cycle (Hydrology).). Using the Borg and Gall model with modifications to the 8 stages of the development model, namely: potential and problems; data collection; product design; design validation; design revision; trial product; product revision; and trial use. In Class V, 22 students took part in large-scale experiments and 6 students carried out small-scale experiments and collected data through questionnaires, interviews, and documentation. The t-test results determine a significance value of 0.00 on both small and large scales. For the N-Gain value criteria, it is included in the "High" category, the calculation produces 0.78 on a small scale and a large scale, namely 0.77. Therefore, Capinus Air Interactive learning media is very suitable for teaching science and improving student learning outcomes.

Keywords: Canva; Capinus air; Learning media; Science lessons; Water cycle

Introduction

Improving education is an effort to build a quality Indonesian society. Education is a process that everyone experiences and is inherent in human life (Bagiarta, 2021). Education is very much needed and has become a basic thing for everyone because with education a person will gain knowledge and skills to develop their potential (Isrokatun et al., 2023; Setiawan & Soniya, 2023). Education is in line with developments with the times and makes use of existing technology (Li et al., 2023; Suhaimi et al., 2023; Sukmara, 2021). The learning process in the learning unit is interactive, exciting, interesting, and challenging, motivating students to participate actively and adapt according to their talents, interests, and physical and psychological development, providing ample space for spontaneity, creativity, and independence (Kanza et al., 2021). Therefore, educational units must be able to plan the learning process which can increase the achievement of good graduate competencies. Steps that can be taken are to create innovations in the teaching and learning process and learning approaches that can develop the potential and skills of students and improve the quality of education that is beneficial for themselves and society.

According to the results of interviews obtained by researchers, especially in science learning in class V, teachers still rarely use IT or projectors, and teachers often only ask students to read learning resource books and then only give them assignments. Apart from that, the development of learning media which is still less than optimal has an impact on student learning outcomes. Based on documentation data on the learning outcomes of class V students at SD Negeri Beringin 02, it can be concluded that science learning outcomes are still

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low, this can be seen from the number of students who scored below the KKM.

From the description of the problem, the media used is still limited, namely only using teacher books, student worksheet books, and learning media in the form of pictures, YouTube videos, and the surrounding environment. Therefore, researchers will develop Capinus Air Learning Media, namely Canva-based learning media for science lesson content which has already been used by teachers. The development of this media is designed to make it easier and support students in participating in learning because this learning media can be used by students independently via existing smartphones. Apart from that, students do not like learning science because the reading must be understood more carefully and the words are difficult for students to understand, so there is a need for media that can help students explain the material in the form of interesting pictures and interactive media.

Learning media can support the learning process and the learning process runs optimally (Imani et al., 2021; Kandia et al., 2023; Sukirman & Setiawan, 2022). Online-based learning media can utilize the Canva application to provide attractive designs (Andarwati & Pujilestari, 2023). The use of technology-based learning media is very important to support students' lifelong learning (Andrasari et al., 2022). Effective use of information and communication technology increases student engagement with theoretical material, and practice becomes easier (Ponomarenko et al., 2023). The use of media is essential in learning, especially for material that is very difficult or abstract, it is time for science learning in elementary schools to be fun so that students are interested in studying science (Arief, 2021). According to the characters (Javed et al., 2023), Canva media is the platform that is most widely used by various agencies. Canva is a graphic design application for designing various kinds of online character designs, such as posters, brochures, and infographics without requiring advanced design skills (Adrian et al., 2022; Hijrah et al., 2021; Putri et al., 2024).

This research is relevant to previous research Jatmiko et al. (2024) states that the Canva application for creating learning video media is categorized as very suitable for use in learning to support the Pancasila learning profile with a score of 89.53% by media experts including in the very suitable category and 80% by material experts included in the very worthy category. Then research conducted by Hidayat et al. (2023), also showed that Canva was also able to test the effectiveness of E-LKPD. In line with the research, Prawijaya et al. (2022) it was found that this research was able to improve the SIPDA teaching and learning process assisted by Canva. In research conducted by Purnamawanti et al. (2023) the N-Gain results obtained reached 94 in the high category and were interpreted as being able to improve student learning outcomes in grade 5 science lessons. There is also research Hapsari et al. (2021) obtained by validation results from material experts and teachers in the "Very Valid" category for the respective results. 86% and 85.57%. The research title "

According to the background description, the researcher will discuss three problem formulations, including: the design of the Capinus Air Interactive learning media; the feasibility of the Capinus Air Interactive learning media; and the effectiveness of the Capinus Air Interactive learning media assisted Canva application to improve science learning outcomes in cycle material for class V students at SD Negeri Beringin 02 Semarang.

Method

The research design used is development research or what is called Research and Development (R&D). This research is carried out to perfect an existing product or create a new one (Sugiyono, 2021). Using the Borg and Gall model with a modification of the 8 stages of the development model, namely: potential and problems; data collection; product design; design validation; design revision; product testing; product revision; and trial use. This research was conducted in class V of SD Negeri Beringin 02 Semarang.

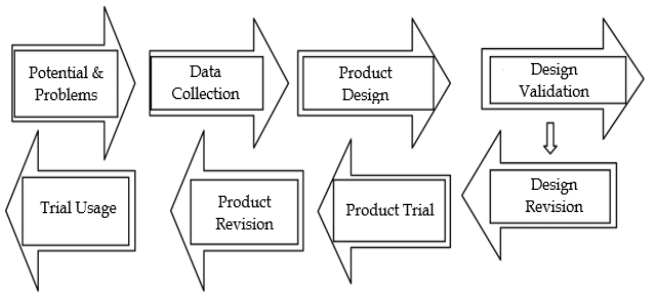

Figure 1. Research and development steps

This research aims to produce Capinus Air learning media with water cycle material by utilizing the Canva application to test: the development of Capinus Air Media; the feasibility of Capinus Air Media; and the effectiveness of Capinus Air Media. The subjects of this research were 28 class V students of SD Negeri Beringin 02 Semarang. Research tools consist of questionnaires, interviews, and documentation.

Results and Discussion

Research Research and development (Research and Development) aims to develop effective learning media for use in learning in certain organizations (Muhlas & Marwani, 2020).

Gathering Information and Solving Problems

At this stage, the researcher identified the problems that existed in the fifth grade of Beringin 02 State Elementary School. From the identification that had been carried out, there were several problems, namely the lack of media used in science learning and the learning outcomes of the water cycle material were not yet optimal. These two problems became the basis for researchers to conduct research to solve problems in the fifth grade of Beringin 02 State Elementary School.

Collecting Data

Researchers collect data for problem-solving. As a solution to problems that occurred in the fifth grade of Beringin 02 State Elementary School, researchers conducted research on the development of Capinus Air Media. The development of Capinus Air Media is tailored to the needs of teachers and students obtained from questionnaires that have been distributed. The contents of the needs questionnaire or teacher and student questionnaire are adjusted to the product specifications.

Designing Products

At this stage, researchers began to develop media designs in the form of Capinus Air Media. Product specifications developed: capinus Air Media learning media combined with the application of the problem-based learning model; the media is prepared with complete material that is appropriate to the learning objectives; capinus Air's media content contains complete material on the water cycle in Indonesia from the five large islands of Indonesia, including Sumatra, Java, Kalimantan, Sulawesi, and Papua. The initial section contains a cover, foreword, learning outcomes, indicators, learning objectives, and instructions for use; the final part after the material is given a learning video display; the duration of the video is structured around three to five minutes to prevent boredom from watching; and the Capinus Air Media learning media is expected to attract students' interest in learning about the water cycle.

(a) (b) (c)

Figure 2. Capinus air media learning media designs: (a) Initial view; (b) Display menu; and (c) Water cycle material

Validating the Design

The Capinus Air Media learning media developed needs to be tested for its suitability through 2 stages of expert testing. The two test stages include material validation by one material expert and media validation by one media expert. The expert test aims to obtain an assessment of materials and media that are suitable for use. The test results are presented in Table 1.

Table 1. Product Validation Results

Validator	Score	Criteria
Material	85	Very worthy
Media	90	Very worthy

It can be concluded that this animated video product based on the Canva application can increase student motivation and learning achievement and is suitable for use in the learning process. Thus it can be concluded that the use of Capinus Air Media can improve student learning outcomes. If Capinus media is used and created with greater creativity, it can support the learning process effectively.

Design Revision

No design needs to be revised at this stage, because based on the scores from material and media expert validators, they have given the maximum score and received very feasible criteria.

Product Trial

Before proceeding to the product testing stage, the researcher carried out a concept understanding test with pre-test and post-test questions on class V students with questions that had been tested regarding the validity test, reliability test, discrimination test, and difficulty level test.

At the validity test stage, this means that the instrument can be used to measure what it should measure (Sugiyono, 2019). Testing the validity of the instrument in this research uses the point biserial

correlation formula. The point biserial formula 1 (Arikunto, 2019).

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$$rpbi = \frac{\text{Mp}-\text{Mt}}{\text{St}}\sqrt{\frac{p}{q}} \quad (1)$$

Information:
r_{pbi} = biserial correlation coefficient
Mp = average score of subjects who answered correctly for the item whose validity was sought.
Mt = mean total score
S = standard deviation of the proportion sum score
P = proportion of deviations from scores that answer correctly

$$p = \frac{Mp}{n} \quad (2)$$

Q = proportion of students who answered incorrectly (q=1-p). According to the results of the validity test, it was concluded that 50 of the 30 questions met the valid criteria that would be used for the next stage.

According to reliability testing Lestari & Yudhanegara (2018), the reliability of an instrument when given to the same subject by different individuals, at different times, or different locations will produce the same or almost identical results (not significantly different). The following is the Kuder and Richardson 20 Formula 3.

$$r = \left(\frac{n}{n-1}\right)\left(\frac{s_i^2-\sum p.q}{s_i^2}\right) \quad (3)$$

Information:
r = reliability coefficient
n = number of questions
s_t^2 = total score variance
p = proportion of subjects who answered correctly
q = proportion of subjects who answered incorrectly

The benchmark for interpreting the degree of reliability of the instrument is determined based on the following criteria according to Guilford.

Table 2. Benchmarks for Interpreting the Degree of Instrument Reliability (Lestari & Yudhanegara, 2018)

Correlation coefficient	Correlation	Reliability Interpretation
0.90 ≤ r ≥ 1.00	Very high	Very regular/excellent
0.70 ≤ r ≥ 0.90	Tall	Still/good
0.40 ≤ r ≥ 0.70	Currently	Fair enough/good enough
0.20 ≤ r ≥ 0.40	Low	Not constant/bad
r < 0.20	Very low	Very unstable/very bad

The results of reliability testing for 30 valid questions are as represented by Table 3.

Table 3. Reliability Test Results

Sum PG	Variants	Reliable
6.0	84.70	0.95

From the reliability test with the *KR-20 formula* using *Ms. software. Excel* , the correlation coefficient (r) is 0.94. Based on Table 2, the level of reliability of the instruments used in the research is very constant/good.

The next step is the Discriminating Power Test to determine the ability of a question to differentiate students with high abilities from students with low abilities as represented by Formula 4.

$$DP = \frac{\overline{X_A}-\overline{X_B}}{SMI} \quad (4)$$

Information:
DP = index of differentiating power of test items
$\bar{X}_A$ = average score of students' answers in the upper group
$\bar{X}_B$ = average score of lower group students' answers
SMI = Ideal Maximum Score, namely the score obtained if students answer all questions correctly

By using the split-half method, students can be divided into two groups based on their scores to determine the top and bottom groups if the sample used is small (no more than 30). The criteria for interpreting the discriminative index are presented in Table 4.

Table 4. Differentiating Power Index Criteria (Arikunto, 2014)

Differentiating Power Interval	Criteria
0.00<DP≤0.20	The question items have poor discriminating power
0.20<DP≤0.40	The question items have sufficient differentiating power
0.40<DP≤0.70	The question items have good differentiating power
0.70<DP≤1.00	The question items have excellent differentiating power

It is known that out of 30 questions, there are 12 questions with sufficient criteria and 18 questions with good criteria. Difficulty level represents the chance of answering a question correctly or incorrectly at a certain level, which is the difficulty level of the item. The following formula is used to determine the difficulty level of the instrument as shown by Formula 5 (Arikunto, 2019).

$$P = \frac{B}{JS} \quad (5)$$

Information:
P = difficulty index
B = the number of students who answered the question correctly
JS = total number of students taking the test

The difficulty index of a question item is interpreted in terms of the criteria described in Table 5.

Table 5. Difficulty Index Criteria (Lestari & Yudhanegara, 2017)

Difficulty Index	Interpretation of the Difficulty Index
IK = 0.00	Too difficult
0.00 < CI ≤ 0.30	Hard
0.30 < CI ≤ 0.70	Currently
0.70 < CI < 1.00	Easy
IK = 1.00	Too easy

It is known that out of 30 questions, there are 7 questions with easy criteria, 16 with medium criteria, and 7 with difficult criteria. From the validity test, reliability test, discrimination test, and difficulty level test, a total of 30 multiple-choice questions were obtained. The pretest questions are asked before the learning media treatment and the posttest is given after the learning media treatment. Followed by conducting small-scale product trials with a total of 6 students. In small-scale trials, several stages must be passed, namely normality tests, t-tests, and N-Gain tests.

Small Scale Normality Test

The normality test is to determine whether the distribution of data follows or approaches a normal distribution.

Table 6. Normality Test Results of Small-Scale Trials

Test	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df	Sig.
Pretest	0.145	6	0.200*	0.969	6	0.888
Posttest	0.289	6	0.128	0.807	6	0.068

*. This is a lower bound of the true significance
a. Lilliefors Significance Correction

The calculation results in Table 6, pretest and posttest data have sig values. 0.888 and 0.068 or greater than 0.05. So it can be concluded that the pretest and posttest data are normal.

T-Test

To determine the effectiveness of using Capinus Air Media, it was analyzed using a paired t-test.

Table 7. T-test results Paired Samples Test

Pair 1	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
pretest - posttest	-53.333333	8.617811	3.518207	-62.377171	-44.289495	-15,159	5	0.000

Table 7 shows the results of the t test on small-scale trials showing sig values. (2-tailed) 0.000 < 0.005 From this test it was concluded that H ₀ was rejected and Ha was accepted, so there was a difference in the average results before treatment and results after treatment.

N-gain test

The N-gain test was carried out to determine the average increase in the pretest and posttest, using N-Gain analysis to compare the differences.

Table 8. N-gain Test Results on a Small Scale Descriptive Statistics

Parameters	N	Min	Max	Mean	Std. Deviation
Small scale N-Gain	6	0.68	0.94	0.78386	0.09473
Valid N (listwise)	6				

Based on the results of test calculations (N-Gain) in small-scale trials, it is known that there was an average increase of 0.78, which is included in the high criteria.

Product Revision

The results of research carried out in the fifth grade of the Beringin 02 State Elementary School with a total of 6 small-scale students showed very good results for Media Capinus Air. Capinus Air Media *is* stated to be very suitable for use in science learning, especially in the water cycle material in fifth grade. Table 9 shows the percentage of responses from teachers and students of 97% and 96.5% in the very good category. Based on the student response questionnaire, it can be concluded that the Capinus Air Media water cycle material is practically used in learning and without revision.

Table 9. Results of Teacher and Student Response Questionnaires

Response	Classical Percentage %	Criteri
Teacher	97.00	Very worth
Student	96.50	Very worth

Trial Use

A large-scale trial was continued to determine the effectiveness of the Capinus Air Media learning media assisted by Canva in improving student learning outcomes. The subjects of the large-scale trial were 22 class V students at Beringin 02 State Elementary School.

Large Scale Normality Test

Table 10. Normality Test Results of Large-Scale Trials

Parameters	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df	Sig.
Pretest	0.168	22	0.109	0.930	22	0.123
Posttest	0.131	22	0.200*	0.942	22	0.218

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

The calculation results in Table 10, pretest and posttest data have sig values. 0.123 and 0.218 or greater than 0.05. So it can be concluded that the pretest and posttest data are normal.

T-Test

To determine the effectiveness of using Capinus Air Media, it was analyzed using a paired t-test as represented in Table 11.

Table 11. T-test results Paired Samples Test

Pair 1	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
pretest - posttest	-45.36364	10.42225	2.22203	-49.98460	-40.74267	-20.415	21	0.000

Table 9 shows the results of the t test on a large-scale trial showing a sig value. (2-tailed) 0.000 < 0.005 From this test it was concluded that H ₀ was rejected and Ha was accepted, so there was a difference in the average results before treatment and results after treatment. So it can be said to be normally distributed and the t-test requirements are met.

N-gain test

The N-gain test was carried out to determine the average increase in the pretest and posttest, using N-Gain analysis to compare the differences.

Table 12. N-gain Test Results on a Large Scale

Parameters	N	Min	Max	Mean	Std Deviation
Small scale NGain	22	.52	1.00	0.7695	0.1508
Valid N (listwise)	22				

Based on the results of test calculations (N-Gain) in large-scale trials, it is known that there was an average increase of 0.77, which is included in the high category.

Conclusion

Learning media is very important for students in the teaching and learning process so that science learning is more varied. The results of the research and discussion of Capinus Air Media assisted by Canva to improve the learning outcomes of Class V students at Beringin 02 State Elementary School were declared valid, practical, and effective. The feasibility of the learning media created received a score of 85% from material expert validation and 90% from media expert validation. Apart from that, from the validity test, reliability test, discrimination test, and difficulty level test, a total of 30 multiple-choice questions were obtained to be used in the pretest and post-test. Data on small and large scales are said to be normal. The t-test also gets a big value. (2-tailed) 0.000 < 0.005 which indicates there is a significant difference between the pre-test and post-test results. Apart from that, the average value of N gain is 0.78 on a small scale and a large scale, namely 0.77 in the high category. This is proven by the use of Capinus Air learning media which can make science learning interesting and fun and improve student learning outcomes.

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Author Contributions
Evy Lissa Defantari (Author 1) is tasked with going into elementary school institutions to carry out observations and research. Apart from that, he is also responsible for carrying out data processing and writing scientific articles. Mr. Sigit Yulianto (Author 2) is the supervisor who guided and directed the author in preparing this scientific article.

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Conflict of interest
The authors declare no conflict of interest.

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