

# Development and Evaluation of a Digital Pop-Up Book on the Concept of Force for Fourth-Grade Science

Dini Hikmatul Fauziyah<sup>1\*</sup>, Petra Kristi Mulyani<sup>1</sup>

<sup>1</sup>Primary School Teacher Education, FIPP, Universitas Negeri Semarang, Semarang, Indonesia.

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Corresponding Author:

Dini Hikmatul Fauziyah

[dinifauziyah9@students.unnes.ac.id](mailto:dinifauziyah9@students.unnes.ac.id)

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**Abstract:** Preliminary research, through observations, questionnaires, and interviews, showed problems in fourth-grade science learning media about force. This research aimed to develop a digital pop-up book on the concept of force. This research used the research and development (RnD) method. The stages of the research were finding potential problems, data collection, product design, design validation, design improvements, product test, product revision, usage test, product revision, and mass production. Media experts validated the pop-up book and assessed it in a category of qualified with a score of 89.50%, meaning that the media emphasized information accordingly to the target; the choice of font and size was correct; the media was attractive, easy to use, made it easier for students to understand the material, and made it easier for teachers to deliver the lesson. The content expert validated the content on force and assessed the accuracy of the content in the category of very suitable with a score of 91.25%, which means that the material was presented coherently, encouraged students' curiosity, was appropriate to support the lesson, activating students, increased students' knowledge, had clear visuals and text, had concise and clear language, and delivered suitable language level. The effectiveness of digital pop-up books in improving students' understanding of the material was shown in the *t*-test result (13.513) and an average increase (N-gain) of pretest and post-test data of 0.55 with medium criteria. Participants' questionnaire showed their opinions on the excellent quality of digital pop-up books. This research indicated that digital pop-up books on the concept of force met the media and content qualification criteria, which motivated and helped the students comprehend the information.

**Keywords:** Digital pop-up book; Force; 4<sup>th</sup> grade elementary school

## Introduction

Education is a right for every citizen. This is stated in the 1945 Constitution Chapter XIII, article 31 paragraph (1) which states that "Every citizen has the right to receive education". With education, humans can gain knowledge, both natural knowledge and social knowledge. Education is a process that aims to obtain balance and perfection in the development of individuals or society. Thus, education is a teaching or training activity for mature humans. Education can also

be interpreted as school, a place of learning activities. The learning process is an activity between teachers and students to achieve learning goals. In this case, the teacher has an important role in determining whether or not the learning objectives are achieved. Teachers must motivate students to take part in learning activities so that learning objectives can be achieved. There are many ways that teachers can increase motivation to learn, one of which is by providing innovative learning media.

Natural and Social Sciences (IPAS) is a new term in the independent curriculum that combines science and social studies subjects (Tlili et al., 2022). The Educational

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Standards, Curriculum, and Assessment Agency of the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia in 2022 stated that IPAS is a science that studies human life as individuals and social creatures who interact with their environment. The main focus of science and science subjects in elementary school is how much students can utilize their knowledge, so in the learning process teachers must be able to facilitate effective learning activities that can attract students' attention so that students can easily understand the material. One of the problems in science and science learning is the low learning outcomes of students, one of the causes is the teacher's role which is not optimal in learning activities. One of the ways to create interesting learning activities is teachers can create creative learning media that can attract students' attention.

Science learning must be able to involve students' activeness both physically and mentally, focus on students, and be based on students' experiences and interests (Darling-Hammond et al., 2020). This problem also occurs at SD Negeri Podorejo 03. For the KKM (Minimum Completeness Criteria), the science lesson content in fourth grade is 65 with a total of 25 students. Judging from the students' daily scores in the scope of material 3 Forces Around Us TP1 (Learning Objective 1) there are 12 out of 25 students (48%) who got a score above the KKM or were declared complete and the remaining 13 out of 25 students (52%) got a score below the KKM or incomplete. At TP2, 13 out of 25 students (52%) got a score above the KKM or completed and 12 out of 25 students (48%) got a score below the KKM or incomplete. In the results of the Mid-Semester Summative Assessment scores, 10 out of 25 students (40%) got scores below the KKM and 15 out of 25 students (60%) got scores below the KKM. Based on these scores, it can be concluded that learning in the scope of material 3 with material forces around us has not run well and the increase in learning outcomes has not increased significantly.

Through interviews and observations, the researchers obtained various phenomena regarding learning, especially in fourth-grade science subjects. The existence of various problems that occur in the learning process on the force around us in science learning makes the researchers strive to make improvements or solutions to achieve a better quality of science learning, especially in students' understanding of the force around us.

This aims to ensure that teachers and prospective teachers can find follow-up actions as solutions related to things that need to be done to overcome various problems that can hinder the learning process. In this way, the learning force around us will run effectively and efficiently so that it can improve student learning

outcomes. Referring to the results of the teacher needs questionnaire and student needs questionnaire, it can also be concluded that the problem with science learning is that the learning resources used in class are less innovative, they still use teacher books, student books, and learning videos without any innovative and fun learning resources. The use of learning media has not been varied so the impact on student learning outcomes is still low.

Student learning outcomes mean a value obtained by students during learning activities. In general, the meaning of learning outcomes is changes in students' overall behavior and abilities after learning both cognitive, affective, and psychomotor abilities (Kuo et al., 2024). The definition of learning according to (Basak et al. (2018) is a tug-of-war interaction between teachers and students, learning will continue without the presence of a teacher because most students can learn independently, but teaching will not take place without a teacher. Grund et al. (2024) states that learning is an effort carried out deliberately, directed, and planned with objectives that have been determined before the process is carried out, as well as controlled implementation which aims to ensure that learning occurs in each person. According to Stehle et al. (2019), learning is an activity that aims to help someone learn new abilities and values.

In the opinion of experts, it can be concluded that learning is an interaction between students and their environment so that students discover new things and can increase their abilities both in terms of knowledge and skills (Ong et al., 2023). The teacher's job is to act as an intermediary and help students discover new abilities, both knowledge and skills, in students. Lubis et al. (2023) state that learning media is one of the factors that has an important role in the learning process. The use of learning media can raise enthusiasm and motivation and increase students' understanding of learning activities. In this case, teachers are required to be more creative in presenting learning media. Nicolaou et al. (2019) state that media in learning are graphic, photographic, or electronic tools, to reconstruct visual or verbal information.

Media is created to help students understand learning material. Learning media is a tool that can help the teaching process and has the function of clarifying the learning material presented so that learning objectives can be carried out well. This is in line with Arisukwu et al. (2022) who explained that media has the nature of conveying messages so that it can stimulate thoughts and feelings for its users, and learning media is a tool that makes the learning process run effectively and efficiently. Based on the opinions above, it can be concluded that learning media is a tool that contains messages and aims to help students understand the

subject matter. Learning media also helps teachers in conveying lesson material so that learning is more effective and efficient. And help to achieve learning goals (Rahiem, 2021).

Learning media has several benefits in supporting the student learning process, including (S. M. Sari et al., 2023); uniform delivery of lesson material; making learning activities more fun and interesting; making the learning process more interactive; efficient in time and energy; improving the quality of learning outcomes; the use of media allows the learning process to be carried out anytime and anywhere; fostering a positive attitude; changing the role of learning to be more positive and productive; making learning material more concrete; overcoming the constraints of limited space and time; and overcoming the limitations of human senses.

It can be concluded that the use of learning media has many benefits that support the learning process so that it becomes more interesting, and fosters students' learning motivation so that learning outcomes increase and can achieve competencies and learning goals. (Lee et al. (2023) state that media selection must be adjusted to the learning objectives or competencies to be achieved. Marpanaji et al. (2018) said there are six criteria for selecting learning media, namely: learning media by the objectives to be achieved, supporting learning content that is facts, concepts, principles or generalizations, practical, flexible, and sustainable, educators are skilled in using the media, target grouping, and technical excellence, drawings, and photos must meet standards.

Research conducted by Sari et al. (2019) entitled Digital Pop-Up Learning Media for Early Childhood Cognitive Development proves that the use of Digital Pop-Up media is effective as a means of supporting learning that is interesting and in line with developments in the 4.0 revolution era. Research conducted (Dandung et al., 2023) with the title Digital Pop-Up Book Media in Food Chain Material for Class V Elementary School stated that the digital pop-up book media developed was suitable for use in learning food chain Class V Elementary School. Research conducted by Yahzunka et al. (2022) entitled the Effect of Using Digital Literacy-based Pop-Up Book Media on Elementary School Students' Fairy Tale Reading Ability states that the use of digital literacy-based pop-up book media can improve the fairy tale reading ability of second-grade school students.

Research conducted by Nowell et al. (2017) entitled "The Learning Science with Digital Pop-Up Book Media" states that the use of digital pop-up book media is effective, can improve elementary school students' critical thinking skills, and advises teachers to use digital pop-up book media, especially in science learning. Research conducted Nizamiyati et al. (2022) with the title

"Development of Digital Pop-Up Book in Mathematics Learning Building Materials for Class V SD/MI" states that Digital Pop Up Book media which is packaged in Powerpoint form is considered suitable for use as a learning resource. From this description, the researchers are interested in developing digital pop-up book media for science and science learning with the title "Development and Evaluation of a Digital Pop-Up Book on the Concept of Force for Fourth-Grade Science."

## Method

The research method in this research is Research and Development (R&D). Research and Development (R&D) is a scientific way to research, design, produce, and test the validity of products that have been produced (Sarpong et al., 2023). This method is appropriate to use in this research because this research aims to produce a learning media product for science subjects, namely the digital pop-up book. The research was conducted in the fourth grade of SD Negeri Podorejo 03, Semarang City, in the science and sciences subject, material on the forces around us. The researchers chose this material because student learning outcomes in this material were still low and teachers had not used learning media. The development model used by researchers was the development model according to Borg and Gall. The Borg and Gall model consists of 10 steps, namely: Potential and problems; data collection; product design; design validation; design improvements; product test; product revision; usage test; product revision; and mass production.

In the research and development of digital pop-up book, the researchers used a development model only up to the stage of testing the effectiveness and feasibility of the media due to limited time and costs for mass production. That each development can choose and determine the most appropriate steps for its research based on the special conditions it faces in the development process. Thus, of the 10 steps, the researchers only used 8 steps, namely: potential and problems; data collection; product design; design validation; design improvements; product test; product revision; and trial use.

## Results and Discussion

Research on the development of a digital pop-up book for learning science and technology material forces around us in fourth grade was carried out at SD Negeri Podorejo 03, Semarang City. This research was carried out through several stages according to Borg and Gall to produce a product that is suitable for use.

*Potential and Problems*

The first stage is potential and problems. At this stage, the researchers made observations in the fourth grade of SD Negeri Podorejo 03 and conducted interviews with fourth grade teachers to analyze the needs of teachers and students. Based on the results of these observations and interviews, it can be seen that the learning media used by teachers is less varied so the delivery of learning material is less interesting and material is less interesting and students' learning motivation is low. This results in low student learning students' learning motivation is low. This results in low student learning outcomes due to students' lack of understanding of the subject matter, especially in science and science subjects, the material force around us. Based on the problems, the researchers took a solution, namely developing a learning media that is interactive, innovative, creative, and effective, and involves technology in its use.

*Data Collection*

After finding potential problems, the researchers collected data to plan products that would be made to overcome the problems. What the researchers did was analyze the needs of teachers and students through a questionnaire regarding the need for developing digital pop-up books. The questionnaire was filled out by Diyah Purwidayati, S.Pd. as a fourth-grade teacher and fourth-grade students at SD Negeri Podorejo 03 for the 2023/2024 academic year. The results of the questionnaires showed that students find it difficult to understand force material, there are obstacles in learning force material. In the learning process, the use of learning media has not varied. More interesting and innovative media is needed to make it easier for students to understand force material.

The learning media that teachers need is technology-based, in this case, the digital pop-up book, which must be accompanied by pictures and sound because students are more interested when presented with pictures. Apart from that, this learning media also uses short, concise, and clear sentences. The digital pop-up book display needs to be designed attractively because it will influence students' level of understanding of the material presented.

*Product Design*

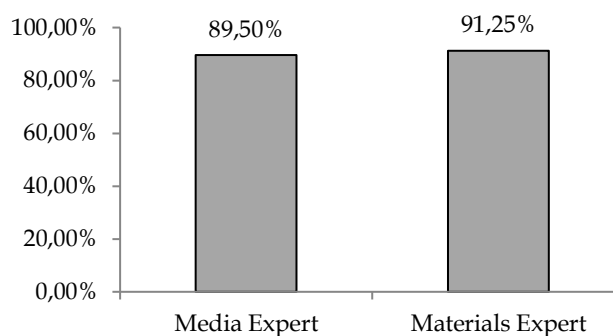
The researchers developed the digital pop-up book based on the data obtained from analyzing the needs of teachers and students. The digital pop-up book was developed by adapting learning outcomes in fourth-grade science subjects, namely: Students utilize the phenomena of magnetism in everyday life, demonstrating various types of forces and their influence on the direction, motion, and shape of objects.

In designing this learning media, the researchers used the Canva application to create image elements which were then downloaded to be inserted into the PowerPoint application. In the PowerPoint application, the researchers designed a presentation that resembled a digital book and made the image elements into 3-dimensional images. Apart from that, the researchers added audio to each material so that it could increase students' motivation to learn.

*Design Validation*

Digital pop-up book design was assessed by media expert validators and content expert validators. The feasibility results are expressed in 4 criteria, namely very qualified criteria with a range of 80% - 100%, qualified criteria with a range of 60% - 79%, less qualified criteria with a range of 20% - 59%, and unqualified criteria with a value below 20%. There are 4 aspects of presentation component assessment by media experts, namely appearance aspects, usage aspects, usefulness aspects, and effectiveness aspects, in these aspects there are 12 questions. The results of the assessment by media experts obtained a total score of 43 with a percentage of 89.50%. The calculation was done by dividing the score obtained and the maximum score is 48, then multiplying it by 100 to get a score of 89.5%, which falls into the very qualified criteria.

There are 4 aspects of presentation component assessment by content experts, namely presentation aspects, content aspects, technical quality aspects, and language aspects, in these aspects there are 21 questions. The results of the assessment by content experts obtained a total score of 73 with a percentage of 91.25%. The calculation was carried out by dividing the score obtained by the maximum score, which is 80, then multiplying it by 100 to obtain a score of 91.25%, which is included in the very qualified criteria.



**Figure 1.** Validation results of digital pop-up book assessment

*Design Improvements*

The next stage is design improvement. The researchers then revised and improved the digital pop-up book according to input or advice from experts. Input from media experts is to enlarge the font on learning

media. An illustration of design improvements can be seen in Figure 2. Meanwhile, input from content experts is adding trigger questions to the digital pop-up book. An illustration of design improvements can be seen in Figure 3.

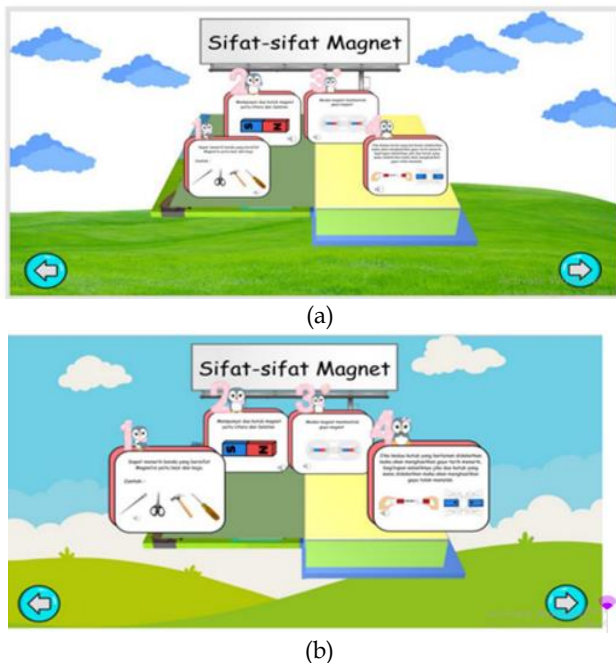


Figure 2. Correction of font size: (a) before, (b) after



Figure 3. Addition of trigger questions

Product Test

The small-scale trial stage aimed to determine the feasibility and response of students to the digital pop-up book in fourth-grade learning activities at SD Negeri Podorejo 03 before a large-scale trial was carried out. This trial phase was carried out on 6 students. The researchers used a purposive sampling technique in carrying out the trial. Purposive sampling is a technique for determining samples with certain criteria. The 6 students were selected heterogeneously with the criteria of 2 top rankings, 2 middle rankings, and 2 low rankings so that small-scale trials could run evenly.

Table 1. Normality Test Result

Statistics	Kolmogorov-Smirnov <sup>a</sup>		Tests of Normality			
	df	Sig.	Statistics	df	Shapiro-Wilk Sig.	
pretest	.265	6	.200 *	.845	6	.143
post-test	.281	6	.149	.885	6	.294

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

The calculation result is in Table 1. Small-scale pretest and post-test data had sig. 0.143 and 0.294 or greater than 0.05. Thus, it can be concluded that the pretest and post-test data on a small scale were normally distributed.

Table 2. Small Scale t-Test Results

	Pretest	Post-test
Mean	60.33	77
Variance	133.46	81.2
Observations	6	6
Pearson Correlation	0.97	
Hypothesized Mean Difference	0	
Df	5	
t Stat	-12.50	
P(T<=t) one-tailed	2.90E-05	
t Critical one-tail	2.01	
P(T<=t) two-tailed	5.81E-05	
t Critical two-tail	2.57	

Table 2 showed the results of the two-sample t-test in the small-scale final test, p-value (5.81E-05) is less than the standard significance level of 0.05. Then H<sub>0</sub> was rejected and H<sub>a</sub> was accepted or interpreted that the digital pop-up book in fourth grade of elementary school about force is effectively used in learning to improve learning outcomes of force material.

Table 3. Small Scale Average Increase (N-Gain) Test

Category	Mark
Pretest	60.33
Post-test	77
Average difference	16.66
N-gain class	0.43
Criteria	Currently

Based on Table 3, it is known that the average increase (n-gain) of pretest and post-test data on a small scale was 0.43 with an average difference of 16.66. This average increase showed that the digital pop-up book is

effective for use in small group trials on fourth grade elementary school about force.

*Product Revision*

From the results of the questionnaire, teachers' responses to small-scale product trials received a percentage score of 95%, which means that the digital pop-up book is very suitable for use. The results of the student questionnaire showed an average percentage of 92.50%, which means the media is very qualified. Apart from that, the result of the small-scale t-test showed that  $H_0$  was rejected and  $H_a$  was accepted, or means that the digital pop-up book in the science and science learning content for fourth grade of SDN Podorejo 03 is

effectively used in learning to improve science learning outcomes in the material of force around us. Based on this data, there were no revisions to the digital pop-up book, and use could be tested at the next stage.

*Usage Test*

After going through small-scale trials, the product was tested on a large scale, such as on a small scale, the data obtained in large-scale trials was also in the form of pretest scores, post-test scores, and student response questionnaires. The data was then analyzed to determine the effectiveness of the learning media developed by the researchers.

**Table 4.** Large-Scale Normality Test Results

	Kolmogorov-Smirnov <sup>a</sup>		Tests of Normality			
	Statistics	df	Sig.	Statistics	df	Sig.
pretest	.167	20	.145*	.946	20	.307
post-test	.122	20	.200	.935	20	.190

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

The calculation result is in Table 4. Large-scale pretest and post-test data have sig values of 0.307 and 0.190 or greater than 0.05. Thus, it can be concluded that the pretest and post-test data on a large scale are normally distributed.

**Table 5.** Large-Scale t-Test Results

t-Test: Paired Two Samples for Means		
	Pretest	Posttest
Mean	60.1	81.45
Variance	116.46	86.89
Observations	20	20
Pearson Correlation	0.83	
Hypothesized Mean Difference	0	
df	19	
t Stat	13.51	
P(T<=t) one-tailed	1.70	
t Critical one-tail	1.72	
P(T<=t) two-tailed	3.40E-11	
t Critical two-tail	2.09	

Table 5 showed the results of the two-sample t-test in the final large-scale test, p-value (3.40E-11) is less than the standard significance level of 0.05, then  $H_0$  was rejected and  $H_a$  was accepted or interpreted that the digital pop-up book in fourth-grade elementary school about force is effectively used in learning to improve students' learning outcomes on force.

Based on Table 6, it is known that the average increase (n-gain) of pretest and post-test data on a large scale was 0.55 with an average difference of 21.35. This average increase showed that the digital pop-up book is

effective for use in small group trials on force material. Based on the data obtained from small-scale product trials with large-scale product trials, the average increase (N-Gain) of pretest and post-test data on a small scale was 0.43 with an average difference of 16.66. Meanwhile, on the large scale, the result obtained was 0.55 with an average difference of 21.35, both were included in the medium criteria, but there was a difference between the two. The small-scale N-gain was higher than the large scale, due to several reasons, namely when testing, if you tried a small scale, the number of group members was smaller compared to a large-scale trial, so students would automatically have more focused and more effective discussions with group members, according to (Stenlund et al., 2017), the group discussion method has a significant influence on teaching and learning activities for improving learning outcomes.

**Table 6.** Large Scale Average Gain (N-Gain) Test Results

Category	Mark
Pretest	60.10
Post-test	81.45
Average ddifference	21.35
N-gain class	0.55
Criteria	Currently

Before developing a digital pop-up book, the researchers first distributed a needs questionnaire which was filled out by teachers and students (Puspitaningrum et al., 2023; Stoian et al., 2022; Susilo et al., 2018). Based on the results of the teacher needs questionnaire, teachers experienced difficulties in providing learning

media, especially technology-based learning media so students' understanding of force material is still low. Teachers provide input to add images and audio to technology-based learning media so that they can increase students' motivation to learn.

Based on the results of the student needs questionnaire, it can be seen that there are problems with learning force material. Students found it difficult to understand force material using learning resources from the student handbook (Lodge et al., 2018; Wahyuningsih et al., 2021). Students preferred learning media based on digital technology where they could easily see real examples by providing pictures. This is in line with the opinion of Mansor et al. (2020) and Ploetzner et al. (2020), namely that digital animation can improve students' learning abilities faster and better. After analyzing the teacher and student needs questionnaire, the researcher developed a digital pop-up book using the PowerPoint application and used the Canva application to create image elements.

The pop-up book digital was then tested for suitability by two experts, namely a media expert and a content expert so that it could be declared a learning media that was suitable for use for students' learning on force material. There were 4 aspects of presentation component assessment by media experts, namely appearance aspects, usage aspects, usefulness aspects, and effectiveness aspects. The results of the assessment by media experts obtained a total score of 43 with a percentage of 89.50% and entered the very suitable criteria. Indicators in the display aspect were that the media display emphasized information according to the target, the choice of font type and size was correct, attractive, easy to use, made it easier for students to understand the material, and made it easier for teachers to convey the material. There were 4 aspects of presentation component assessment by content experts, namely presentation aspects, content aspects, technical quality aspects, and language aspects (Waluyo et al., 2021). The results of the assessment by content experts obtained a total score of 73 with a percentage of 91.25% and entered the very suitable criteria.

Indicators in this aspect were that the material was presented coherently, encouraged students' curiosity, was appropriate to support the lesson, was activating students, increased students' knowledge, had clear visuals and text, had concise and clear language, and delivered a suitable language level. The effectiveness of the digital pop-up book could be determined through pretest and post-test and teacher and student response questionnaires (Rahmiati et al., 2023; Sunarti et al., 2023). In the small-scale test, the data on the average pretest score was 60.3 and post-test 77. During the pretest, 3 students completed it and during the post-test, 6 students completed it. After that, normality was tested

by obtaining sig values of 0.143 and 0.294 or greater than 0.05. Thus, it can be concluded that the pretest and post-test data on a small scale are normally distributed. The calculation hypothesis obtained the  $t_{\text{count}}$  value = 12.5 and  $t_{\text{table}} = 2.57$ . From the calculation result, it was obtained that  $t_{\text{count}} = 12.5 > t_{\text{table}} = 2.57$ , then  $H_0$  was rejected and  $H_a$  was accepted or interpreted that the digital pop-up book in fourth grade elementary school on force material is effectively used in learning to improve learning outcomes on force material.

The average increase (n-gain) of pretest and post-test data on a small scale obtained was 0.43 with an average difference of 16.66. This average increase showed that the digital pop-up book is effective for use in small group trials on fourth grade elementary school on force material. The results of the teacher response questionnaire regarding the use of digital pop-up book in small groups were that they got a percentage score of 95% and were included in the very effective category. Then, in the questionnaire, students' responses on a small scale obtained a percentage of 92.5% and were included in the very effective category. In large-scale use trials, student learning outcomes were obtained in the form of pretest and post-test. From the calculation results, it was obtained that  $t_{\text{count}} = 13.5 > t_{\text{table}} = 2.09$ , then  $H_0$  is rejected and  $H_a$  is accepted or interpreted that the digital pop-up book in fourth-grade elementary school on force material is effectively used in learning to improve learning outcomes students on force material.

The average increase (n-gain) of pretest and post-test data on a large scale obtained was 0.55 with an average difference of 21.35. This average increase showed that the digital pop-up book is effective for use in small group trials on force material. The results of the teacher response questionnaire obtained a percentage score of 95% in the very suitable category and the average student response results were 95% in the very suitable category. So that the digital pop-up book learning media is effectively used in fourth-grade elementary school on force material.

Using appropriate learning media can attract students' attention to learning and make it easier for students to understand the lesson material (Liando et al., 2022; Marhamah et al., 2022). Thus, an innovation is needed to develop learning media that can help students in the learning process (Nusroh et al., 2022). One of the developments in learning media that can be packaged attractively so that it can motivate students' learning and help facilitate students' understanding of the subject matter is the digital pop-up book. According to Haleem et al. (2022), the correct use of digital technology media can result in learning activities and efforts to obtain information and knowledge becoming more effective and efficient. The use of digital technology as a tool can improve learning quality and outcomes, as well as add

21st-century skills that will be needed in the future (Siddiq et al., 2024; van Laar et al., 2020).

In general, a digital pop-up book is a digital book that has two-dimensional elements and contains text, images, sound, and moving animations. A digital pop-up book is a learning media containing lesson material that is created and designed attractively. According to Dwivedi et al. (2022) that pop-up book media is a book that has three-dimensional elements that can move when opening the page, thus creating an appearance that can attract students to the learning material. Meanwhile, the digital pop-up book is digital-based and has two-dimensional elements, has attractive image displays, can be accessed easily can be used for a long time, and is not easily damaged (Kurniawan et al., 2024; Quach et al., 2022).

In this research, the applications used to create the digital pop-up book are Canva and Microsoft PowerPoint. The Canva application was used to create elements or images needed in creating a digital pop-up book with attractive characters presented to support the lesson material. After creating the elements in Canva, the book animation in the PowerPoint application was then filled with the elements that have been created, and adding sound and moving animation effects to make the media even more interesting. The researchers chose the PowerPoint application because the application is easy for teachers to use can be opened via other computer devices and can last a long time (Rahiem, 2021). PowerPoint application has functions or uses, namely: a means to make presentations easier, creating a softcopy presentation so that it can be accessed by various computers, presentations are more interesting and enjoyable with the support of audio, video, images, and animations as well as templates that will be used, make it easier to create, organize, and print various slides. This research is also strengthened by relevant previous research, as follows.

## Conclusion

Based on the results of research on the development of a digital pop-up book in the science and science learning subject, force material around us, fourth grade, Elementary School, it can be concluded that researchers have succeeded in developing a digital pop-up book in the science and science learning subject, force around us, fourth grade. SD Negeri Podorejo 03 goes through several stages, namely: potential and problems; data collection; product design; design validation; design improvements; product testing; product revision; and product trials. The digital pop-up book was developed based on an assessment of its feasibility by two experts, namely a media expert and a content expert, and is included in the very qualified category.

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## Author Contributions

Conceptualization; methodology.; validation.; formal analysis.; investigation.; resources.; data curation.: writing—original.; D. H. F.; draft preparation. ;writing—review and editing: visualization: P. K. M. All authors have read and agreed to the published version of the manuscript.

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## Conflict of interest

The authors declare no conflict of interest.

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