JPPIPA 11(4) (2025)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Development of Food Chain Magic Box Media Based on Problem Based Learning to Improve the Learning Outcomes of Elementary School Grade V Students

Maharani Novtia Putri Amanda[1*], Desi Wulandari[1]

[1] Departement of Elementary School Teacher Education, Faculty of Education and Psychology, Universitas Negeri Semarang, Semarang, Indonesia.

Received: September 04, 2024
Revised: February 11, 2025
Accepted: April 25, 2025
Published: April 30, 2025

Corresponding Author:
Maharani Novtia Putri Amanda
maharaniamanda13@students.unnes.ac.id

DOI: 10.29303/jppipa.v11i4.11043

Abstract: This study uses the type of Research and Development (R&D) development research with the Borg and Gall development model which aims to develop, test the feasibility and effectiveness of food chain magic box media based on problem-based learning. The population in the study consisted of 6 subjects for small-scale tests from class V of SDN Ngaliyan 03 and 26 subjects for large-scale tests from class V of SDN Ngaliyan 05. The data collection techniques used are test and non-test techniques. The results of the product validation assessment obtained an average percentage of 92.5% from media validators and an average percentage of 90% from material validators with both categories being very feasible. The results of the pretest and posttest of students in the small-scale test have increased with an average difference of 43.4 and N-Gain of 0.7801 with a high category. In large-scale tests, there was also an increase in pretest results, judging from the posttest results obtained with an average difference of 47 and an N-Gain of 0.7801 with a high category. This proves that the use of food chain magic box media based on problem-based learning in class V social studies learning is effective in improving the learning outcomes of social studies for grade V students of SDN Ngaliyan 05.

Keywords: Media magic box; Problem based learning; Understanding of IPAS

Introduction

Education is a barrier to the development of civilization. This can be seen in the Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System Article 1, explaining that education is a plan for the realization of learning events within the scope of learning so that students are eager to expand their understanding to have handling, intelligence, and what they want for themselves, society, nation and state (Anwar, 2018). Education is an effort made from the learning process both from academic and non-academic perspectives, which aims to enable students to develop their knowledge, attitudes, and behaviors for the better (Anatasya et al., 2021).

This research is in line with research conducted by Al-Husseini et al. (2021) and Havik et al. (2020), namely Education is the process of acquiring better knowledge, attitudes and skills from an educator to his students in the scope of learning in order to achieve learning goals. Education encourages students to create disciplinary traits, seen in the phrase "think like a scientist", which frame true truth as something different from beliefs and traditions (Sumonja, 2023). The goal of education itself is to be able to control oneself, have an attitude, and also have the intelligence, morals, and skills necessary for oneself, society, nation and state (Muchith, 2016).

How to Cite:
Amanda, M. N. P., & Wulandari, D. (2025). Development of Food Chain Magic Box Media Based on Problem Based Learning to Improve the Learning Outcomes of Elementary School Grade V Students. *Jurnal Penelitian Pendidikan IPA*, *11*(4), 274–286. https://doi.org/10.29303/jppipa.v11i4.11043

Education is a major need and must be done for a person to become better. In education, the learning process is the most important part. Learning is a relationship that occurs due to the presence of students and teachers with the emergence of learning resources (Ong et al., 2023; Sungur et al., 2006).

The teaching profession as a teaching and learning discipline plays a major role in compiling and building the philosophy of science. In addition to being able to strengthen old knowledge, the educator profession also has the potential to provide a variety of knowledge and supporting knowledge (Dunne, 2023). The role of teachers in the implementation of teaching and learning is certainly very important because it is related to the stages of students' thinking that are in line with their learning progress (Nieto-Márquez et al., 2020). Teachers hold the key to the implementation of fun learning according to the needs of students, this happens because of the role of teachers (Monteiro et al., 2021; Nadeem et al., 2023).

Teachers strive to have great abilities, know how to innovate and develop new knowledge. In addition, teachers strive to work on each lesson unit plan, implement and develop media and be able to choose creative and effective methods (Ali, 2022). The achievements obtained by teachers in teaching are not seen from how teachers teach the material, but also in many aspects that are supported so that learning is achieved (Melindawati et al., 2023).

Education is regulated in the national education curriculum where the current curriculum is an independent curriculum. The integration of Natural Sciences (IPA) and Social Sciences (IPS) into Natural and Social Sciences (IPAS) is the main element of the independent curriculum in action to improve the quality of education. In elementary school learning, teachers need to activate the learning process The best classroom model is based on an active learning approach, which provides student participation and comprehensive insights into the subject matter through students' active activities in the classroom face-to-face (Odum et al., 2021; Prince, 2004). Students are subjects who have the ability to discover, process, and use their knowledge during learning (Mantoviana et al., 2023), therefore the role of teachers is presented to help optimize student growth and development properly through a series of effective learning. Today, teachers face new challenges and must solve the difficulties that come with tailoring teaching and learning to students' desires and interests. Teachers should practice a variety of ways to encourage students to be active participants who are motivated and enthusiastic about their learning. One way is to use the right learning materials and in accordance with what is taught by the teacher (Repelita et al., 2023).

According to Faiz et al. (2021), in the current era of educational technology, educators are asked to be able to carry out creative and innovative learning in realizing the learning process. For this reason, in science learning, teachers urgently need learning media that can help and encourage teaching in the classroom (Festiyed et al., 2023). Hamalik in Wardani et al. (2024) explained that the use of learning media can increase students' desire and interest in learning and can also improve the quality of learning which will later affect student learning outcomes. Through the use of this learning media, it is hoped that it can improve the quality of teaching and learning which will then also have an impact on student learning outcomes (Sudjana et al., 2019). Media is needed in order to be an intermediary between teachers and students (Istyadji et al., 2022).

Learning media is considered a tool to support learning and is used to channel roles (learning materials) with media that can attract students' attention, interests, thoughts, and emotions during learning (Monhartini et al., 2023). The provision of learning media can help teachers in channeling lessons, and in addition, the use of media during learning makes the learning atmosphere more interesting and students more focused on learning (Fadilah et al., 2023). With the presence of this media, it can bring students to a good stage again (Zirawaga et al., 2017). Learning to achieve learning goals, therefore the use of learning media will make it easier for students to understand lessons (Susanto et al., 2022). In addition, the use of media must be aligned with the material to be taught in accordance with the learning guidelines (Wardana et al., 2022).

The results of observations made by researchers at SDN Ngaliyan 05 Semarang City on grade V teachers were obtained The learning process in grade V students, especially in this food chain material, is that teachers are still very monotonous in explaining, classroom teachers have also not used effective media in the implementation of learning. So teachers only use Power Point (PPT) and even only display 2-dimensional image media from the internet, so the limitations of these media can affect student learning outcomes where this material is only memorized and remembered. This is very easy for students to forget. From what has been described, the insights students gain during their studies, including basic insights and insights gained in class and more complex insights (Apritama et al., 2023).

This problem is supported by data on the learning outcomes of class V students in the content of IPAS semester 1, the number of class V students of SDN Ngaliyan 05, Semarang City for the 2023/2024 school year is 26 students, including 10 male students and 16 female students. In the content of the IPAS material on the Food Chain Based on the number of class V students

as many as 26 students, most students have scores below the KKTP. This can be seen from the results of the daily test scores in the food chain, the data obtained as many as 64% or 14 children have scores below the KKTP and 36% or 12 other students have achieved the KKTP.

In the learning process of social studies, especially in the above problems, teachers should use varied media, which can attract interest in learning in students so that students can easily understand the materials delivered by the teacher using appropriate media, so that student learning motivation increases and can improve student learning outcomes. From various kinds of media such as printed books, it is also not enough to make students understand the content of the materials in the book, but it must also be supported by facilities and infrastructure that support the learning process such as learning media that can attract the attention of student participants such as concrete media. In this IPAS learning, the author develops learning media, one of which is the Media Magic Box. In this assessment, the learning material that will be delivered is Ecosystem material, especially on the topic of the food chain. The selection of Magic Box media can help teachers in explaining the material on the sequence of the food chain cycle. This media has advantages compared to the use of media in the form of 2-dimensional images, where this Magic Box media can show.

In addition to media feasibility validation by material experts and media experts, other eligibility requirements for Problem Based Learning-based Food Chain Magic Box media are through a questionnaire to respond to media use trials by teachers and students. The trials carried out in this study were three times, namely small group trials and large group trials. The small group trial was attended by 6 grade V students of SDN Ngaliyan 03 Semarang City. In the small group trial, the student response questionnaire obtained a score of 98% with a very feasible category. In this small group test, students do not give suggestions or input to the researcher to improve the media, so that after the small group trial the developed media can be tested in a large group. The large group trial was attended by 26 students in grade V of SDN Ngaliyan 05 Semarang City. Feasibility validation was carried out in this large group test through the results of the survey of students and also class V teachers. Meanwhile, the results of the students' responses obtained a score of 95% with the category of very feasible.

This research is in line with research conducted by Retno Ambarwati, the results of her research found that learning outcomes in science subjects are still low. The number of students in class V is 23 people. When the test was conducted, only 9 students (39.13%) completed with an average of 66.00, of which the other 14 students (60.87%) were declared to have failed the exam, as their scores were below average. The low level of learning that occurs is caused by the inappropriate use of media so that students do not focus on what the teacher explains.

Based on these problems, researchers developed products that can improve science learning outcomes in Ecosystem materials, especially food chain topics that allow students to understand the learning materials delivered by teachers without boredom and boredom. In addition, media development can help the role of teachers in the teaching and learning process in the classroom and can also support learning activities where students are enthusiastic in responding well to lessons. So that the results of science learning in the material can be optimal. Seeing what has been explained above, the researcher has raised the title of the research, namely "Development of Porblem-Based Learning-Based Food Chain Magic Box Media to Improve Social Science Learning Outcomes Class V SDN Ngaliyan 05 Semarang City". The selection of problem-based learning magic box media as a solution to overcome problems in social studies learning in class V. So, after the presentation of this problem-based learning food chain magic box media, it is very effective and can also improve students' social studies learning outcomes. Seen in the diagram below, it is the completeness of the learning results of the IPAS content of the Food Chain Class V material of SDN Ngaliyan 05, Semarang City.

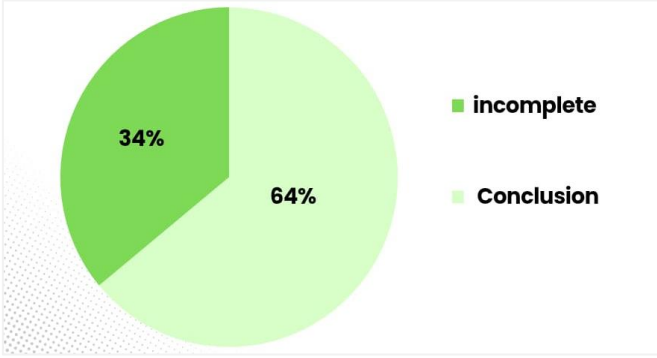

Figure 1. Percentage of completeness of learning outcomes of grade V students of SDN Ngaliyan 05

This research is supported by research conducted by Nurul Tsanidya, Dania. 2019. The title of the research is "Development of Mgic Box Media, Changes in Material Shape of Objects and Their Properties Class V SDN 3 Kunduran Blora". From the results, it has been explained that the percentage of material experts is 83.3% (very feasible0 and the percentage of media experts is 93.3% (very feasible). The learning achievement of natural sciences is a level with the title Development of Magic Box Media Material for Changing the Shape of Objects and Their Properties

Class V SDN 3 Kunduran Blora. The achievement of science learning increased as evidenced by the average posttest result of 87.5, compared to the average pretest of 69.1 with the acquisition of N-Gain = 0.59 in the medium criterion, and the t-test o.662. It can be drawn that the magic box media is suitable for use and effective in improving the learning outcomes of grade V students of SDN 3 Kunduran Blora. Suggestions for this research so that we can develop this media so that the quality of lessons can be improved.

The research that strengthens this research is conducted by Veryawan et al. (2021) the results of their research on "Magic Box Playing Activities in an Effort to Improve Early Childhood Science Skills" namely improving learning, it can be concluded that the magic box playing activity carried out in group B II Methodist Binjai Kindergarten has been able to improve children's science skills in recognizing the concept of Qualitative objects. Quantitatively, it can be seen that the second cycle of assessment recap data has seen an increase in the ability to recognize object concepts in the number of children with a prepredicate (BSH) developing as expected to reach 53% and the number of children with a predicate (BSB) developing very well reaching 47%.

Furthermore, previous research was conducted by Research from Abdiyah (2022) "Development of Magic Box Media Based on Science Process Skills in Ecosystem Materials. Master's Thesis, Uin Sunan Kalijaga Yogyakarta." Based on material experts, he got a percentage score of 96%. In the validation of media experts, the score percentage is 94%. In validation, practitioners or teachers get a percentage score of 92%. The results of the small group trial got a score percentage of 98.3% while the large group trial got a score percentage of 97.6%.

This can be seen from the research that has been conducted, researchers will develop a food chain magic box media based on problem-based learning. The learning method used by the researcher is one of the appropriate learning methods to improve students' ability to solve problems in learning (Sungur et al., 2006). Problem Based Lerning is independently solved learning where the problem is unstructured (Raaijmakers et al., 2018). Problems are the main key in the Problem Based Lerning method, an important intermediary for the effectiveness of problem-solving skills in the way of learning. With this, Problem Based Learning can significantly create self-managed learning to enhance teaching and learning excellence. In this case, this learning method has a direction to improve one's skills through varied learning and high-level thinking.

Method

In this study, a type of research is used for Research and Development (R&D), which is a procedure used to develop and validate educational products (Setyosari, 2016). Meanwhile, Sukmadinata (2017) explained that development research is developing new goods or perfecting existing ones.

The development model that will be used is the model according to Borg and Gall. There are 10 steps of the Borg and Gall model (Borg et al., 1998), namely: potentials and problems; collection of data or information; product design; design validation; design revision; product trials; product revision; trial use; product revision; and mass product manufacturing. The researcher will use only 8 steps, because of cost and time limitations so that the step of product revision and mass product manufacturing is not used. The development model can be described as follows.

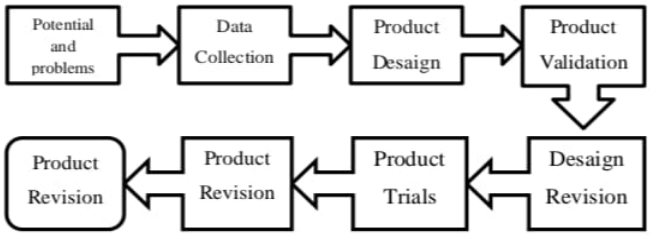

Figure 2. Borg and Gal development

Research with the Borg and Gall model with eight phases will be carried out to develop, namely through the stages of potential problems, data blunting, product design, design validation, design revision, product trial, product revision, and finally use trials. The product developed is a food chain magic box media based on problem-based learning for grade V students of SDN Ngaliyan 05. After the product to be made is designed, then validation will be carried out with experts so that the shortcomings in the product are known. Design improvements are made after receiving input from validators to reduce product shortcomings. The design of a product that has been prepared cannot be conveyed directly to students, but must first be created into a finished product and tested. Product testing can be done by conducting product trials, to determine the effectiveness of the product being developed. Food chain magic box media product trials were carried out on a small-scale test and a large-scale test.

Magic box media is a cube-shaped media in which there are materials, games and questions about food chain materials. The magic box media can attract students' attention because of the box-like shape that makes students curious about the content in the media. The use of Problem Based Learning-based Food Chain

Magic Box media can provide opportunities for students to learn independently, get learning materials based on discussion activities, increase student activity, train students to interact and communicate through group activities, and be able to improve their abilities.

Table 1. Media Expert Assessment Instrument Grid

Aspects	Item Number
Learning	1,2,3,4
Presentation Eligibility	5,6,7
Interactivity	8,9,10
Display and Media	11,12,13,14,15,16
Language	17,18
Media	19,20

Table 2. Grid of Material Expert Assessment Instruments

Aspects	Item Number
Learning	1,2,3,4,5,6
Language	7,8,9
Contents of the Material	10,11,12,13,14,15

Table 3. Validator Rating Scale

Alternative Answers		Score
Excellent	(SB)	4
Good	(B)	3
Enough	(C)	2
Display and Media	(K)	1

Table 4. Product Eligibility Criteria

Percentage	Criterion
82% - 100%	Highly Worth It
63% - 81%	Proper
44% - 62%	Quite Decent
25% - 43 %	Not Eligible

After the product is developed, a feasibility test is carried out by media experts and material experts. Furthermore, design revisions and revisions of the existing materials on the food chain's magic box media based on problem-based learning are carried out according to suggestions from media experts and material experts, as well as conducting trial questions. The test questions were carried out on class V students with a total of 50 questions. Next, the questions were tested for validity.

Based on Table 5, the researcher selected 20 out of 24 valid question items in table 5 as pretest and posttest questions. The next stage is a trial of the use of food chain magic box media products. In this first use trial, the researcher used a small group with a total of 6 test subjects of grade V students of SDN Ngaliyan 03. At this stage, students and classroom teachers were also given a response questionnaire regarding the food chain's magic box media

Table 5. Results of Validating Trial Questions

Criterion	Question No.	Sum
Valid	1, 2, 5, 7, 8, 13, 15, 16, 17, 20, 21, 23, 31, 32, 33 ,34, 35, 36, 38, 39, 40, 41, 42, 46	24
Invalid	3, 4, 6, 9, 10, 11, 12, 14, 18, 19, 22, 24, 25, 26, 27, 28, 29, 30, 37, 43, 44, 45, 47, 48, 49, 50	26

After the product trial is carried out, the next stage is to revise based on the results of the questionnaire of teacher and student responses regarding the media magic box of products that have been repaired and considered feasible, then a trial can be carried out. The trial of the use of products in this study involved a large group with a total of 26 students from class V of SDN Ngaliyan 05. At this stage, students will work on pretest and posttest questions, and in the implementation of the teacher and students are also distributed response questionnaires regarding the food chain magic box media that has been developed. Product revisions are re-performed if necessary, based on the results of product revisions.

$$\text{N-Gain} = \frac{Posttest\ Score - Pretest\ Score}{Maximum\ Score - Pretest\ Score} \quad (1)$$

Then the N-Gain obtained changes in the gain index criteria according to Dinata et al. (2024) are as follows.

Table 6. Interpretation Criteria for the Gain Index

N-Gain Value	Criterion
N-*Gain* ≥ 0.70	Tall
0.30 < N-Gain < 0.70	Keep
N-*Gain* ≤ 0.30	Low

Result and Discussion

Food Chain Media Development Process Based on Problem Based Learning Model

The development of Problem Based Learning-based food chain magic box media is carried out through several stages, including potential and problem stages, data collection, product design, design validation, design revision, product trial, design revision and usage test. The media manipulation carried out by the researcher was adjusted to the initial stages, namely the potential and problem stages. At this stage of potential and problem, the researcher conducted several analyses, including curriculum analysis, learning process analysis, and analysis of the use of learning media. The results were obtained from observations and interviews with grade V teachers of SDN Ngaliyan 05.

According to the results of the analysis of the potential and problems, it is known that the learning model applied by classroom teachers during teaching is a problem-based learning model with the application of several learning methods such as discussions, lectures,

questions and answers, and assignments that have not been maximized due to the lack of learning media in food chain materials. The lack of learning media greatly hinders the teaching and learning process in the classroom. During learning, teachers use 2D drawing media sourced from the internet and Power Point (PPT). The limited media causes students to not understand the material taught so that the learning results obtained are not optimal. This is in accordance with the opinion of Wirantini et al. (2022) that three components that can support the success of learning are teachers, students, and learning media.

According to research, the application of a problem-based learning model helps students understand problems, seek information, plan problem-solving, and solve problems in an appropriate way. In addition, the role of teachers cannot be separated from the learning process; the teacher serves as a facilitator and is responsible for guiding and directing students in their learning process to ensure that students acquire useful knowledge and can solve problems according to the abilities of each student (Pramasdyasari et al., 2024).

Potential and Problems

This research started from the problems that existed at the research site. Potential and Problems are everything that, if used properly, will get added value and problems can occur if the goals are not in accordance with expectations. The research was carried out because there were problems that were used as potential through Research and Development (R&D). Based on the results of the pre-research, several problems were found, ranging from the factors of students who lack focus on learning, less diverse learning resources, and student learning outcomes. The problems that have been mentioned are also supported by the data on the learning outcomes of grade V students in the content of IPAS semester 1 of the Food Chain material. Based on the number of class V students as many as 26 students, most students have grades below the KKTP. This can be seen from the results of daily test scores in the food chain, data obtained as many as 64% or 14 children have scores below KKTP and another 36% or 12 students have reached KKTP.

Based on these problems, the researcher chose to develop a food chain magic box media based on problem-based learning as a solution. The selection of this product is a solution to overcome problems in learning science in class V.

Data Collection

Information Collection After the potential and problems can be shown in fact, various information is then collected from sources and experts in the field. In this stage, the resulting product is a food chain magic box media based on problem-based learning. Teachers have not used concrete learning media in food chain materials, so teachers and students agree on the development of Problem Based Learning Food Chain Magic Box media to improve learning outcomes and students' critical thinking skills. Magic Boxes can include a wide variety of tools and materials that stimulate students' curiosity and creativity. By facing these challenges, students are encouraged to think critically and creatively, as well as develop problem-solving skills (Anggita et al., 2023).

The research is also related to research conducted by Satifa et al. (2023) with the research title "Ecosystem Box Defense Media in Science Learning in Elementary School Class V", namely the activity that will be carried out, namely a trial of the developed media, namely the Ecosystem Box media (KOSIS) which has been validated by material experts and media experts and revised by researchers and has been declared feasible for classroom testing. The Ecosystem Box (KOSIS) media trial was carried out on grade V students at SDN 19 Mataram consisting of 20 students. The researcher distributed a practicality questionnaire to teachers and students to measure the practicality of the Ecosystem Box (KOSIS) media developed.

Table 7. Food Chain Magic Box Media Design based on Problem Based Learning

Design	Explanation
Initial Parts	
	The outside of the Problem Based Learning-based food chain magic box media contains the title of the material as well as the title of the mefia that will be developed, namely "Food Chain Magic Box Media"

Figure 3. Media magic box

Design Contents Section	Explanation
 **Figure 4.** Part 1 media *magic box*	On the first side, there are learning outcomes related to the food chain, learning objectives and materials about the food chain including, the definition of the food chain, the components of the meaning chain, types of food chains, examples of food chains and their roles, and the impact of food chain imbalances on ecosystems.
 **Figure 5.** Part 2 media *magic box*	On the second side, there are five bags of the food chain. The developer provides picture cards, where students can correctly arrange the order of the food chain into the boxes provided. This can trigger students to be able to actively contribute to learning and make students attractive to magic box media.
 **Figure 6.** Part 4 media *magic box*	On the third side, a Student Worksheet (LKPD) is provided where the LKPD is done in groups by cutting out a picture and then pasting it on the part of the food chain sequence that is broken.

Design	Explanation
 **Figure 7.** Part 5 media *magic box*	On the fourth side, there is a Food Chain Magic Box Media Developer Profile, namely the Developer Profile and the Lecturer Profile. In addition, there is a group spinner where this spinner is used for student presentations from the results of the LKPD discussion that has been given.
 **Figure 8.** Media *magic box* base	In the box base, there are examples of food chains in various ecosystems ranging from food chains in gardens, food chains in rice fields, and food chains in the sea.

Product Design

In Natural Sciences subjects, the Magic Box learning media is used to teach material about ecosystems. This medium is in the form of a box or cube that contains material that is only visible when the box is opened, and students will not know the contents of the box until the box is closed. Thus, the application of this medium will make students interested and curious about what is in it.

In its application, students get material or learning through direct experience, namely through experimental activities that the researcher has prepared in the developed media. Through these research activities, students will build their own knowledge, find meaning, find what has been learned, and conclude the results of the activities carried out.

Based on the results of the interviews, SDN Ngaliyan 05 still has limitations in the use of innovative learning media for social studies learning. Teachers and students argue that interesting learning media can make the learning process more fun and interesting. Because of this, the researcher developed a food chain magic box media based on problem-based learning, this media can be a solution to improve memorable and interesting learning so that it can support the improvement of learning outcomes of grade V students.

Validation of the Feasibility of Food Chain Magic Box Media Design based on Problem Based Learning

The next step is product design validation. This can be used by distributing questionnaires by experts selected by validators. To identify the shortcomings and advantages of a product, product assessment is carried out with the help of experts who are skilled and experienced in providing value. In addition, this stage is very dizzy in determining whether the learning materials and media have been said to be suitable for use in learning. In this study, two media and material experts played a very important role in the validation of

the product. The results of the validation of the food chain magic box media and the material experts below are as follows.

Table 8. Recapitulation of Media Expert Assessment Results

Aspects	Percentage	Criterion
Learning	100%	Highly Worth It
Presentation Eligibility	83.5%	Highly Worth It
Interactivity	93.75%	Highly Worth It
Display and Media	98.5%	Highly Worth It
Language	87.5%	Highly Worth It
Media	100%	Highly Worth It
Sum	92.5%	Highly Worth It

Table 9. Recapitulation of Material Expert Assessment Results

Aspects	Percentage	Criterion
Learning	90.5%	Highly Worth It
Language	100%	Highly Worth It
Contents of the Material	85.75%	Highly Worth It
Sum	90%	Highly Worth It

Tables 8 and 9 show the results of the validation of food chain magic box media and media materials with a percentage above 82%, so it can be concluded that Food Chain Magic Box Media based on Problem Based Learning is very feasible to be used in IPAS learning.

This research is related to previous research conducted by Lestari et al. (2024) with the title "Development of Borama Media (Food Chain Box) in Science Learning in Grade 5 Elementary School". Namely From the results of the table, there is a conclusion, namely that the value of 93.1% is included in the category of "Very Valid/Practical" from Mr. MR. There is a score of 90.6%, which is the "Very Valid/Practical" category from Mr. AP Also includes a score from Mr. DM, which is 80% of the Valid/Feasible category. And finally from the validation of teachers at SDN 1 Sumber Hidup ibu SM, which is with a score of 95% in the category "Very Valid/Practical".

Design Revision

Design Revision is a stage of improving learning media after getting input from material experts and media experts. This revision is carried out to improve the media developed to make it more feasible when used to support the learning process. The following is a revision of the Magic Box media product of the food chain based on Problem Based Learning.

Table 10. Magic Box Product Revision based on Problem Based Learning

No.	Explanation
1.	Revising the syntax sequence in the PBL learning model while replacing the cartoon image in the example of activities that show PBL elements, replacing the second syntax in the PBL model according to the input of media experts, and shifting the first syntax (the use of the Food Chain magic box media) to the third syntax so that the syntax sequence becomes more systematic and orderly according to the order of the model PBL Learning.
2.	 **Figure 9.** Magic box base material revision
	Revising the basic materials of the Food Chain magic box media, for the criteria of color, design, and layout is very feasible. However, there is a revision to the basic material of the magic box media, namely first the basic material of the media, namely cardboard, then changed to board/plywood so that the quality produced by the product is very good. In addition, in order to have a beautiful functional value and add to the easthatican of the Food Chain magic box media.

Product Trials

The Megic Box media based on problem-based learning has been evaluated by media and material experts, and researchers have revised it. Researchers also tested the product on a small scale. SDN Ngaliyan 03, which has 6 students, conducted this small-scale trial. The purpose of the small-scale product use trial was to find out how effective the food chain's magic box media is, which is based on problem-based learning before being used in large-scale trials. The results of small-scale trials can be seen through pretest and posttest scores. The results of other small-scale trials show how effective this magic box media is on a small scale.

Table 11. Pretest and Posttest Results in Small Scale Tests

Test Type	Average	Average Difference
Pretest	44.6	43,4
Posttest	88	

According to the data from table 11, the posttest results of the small-scale trial showed that six students obtained scores above the KKTP. The average score of the pretest is 44.6 with a completion percentage of 0%, and the average score of the posttest is 88 with a completion percentage of 100%. Therefore, it can be concluded that the average score of pretest and posttest results in small-scale trials increased by 43.4 with a percentage of completeness of 100%, and the average score of the N-Gain test was carried out to find out the standard of the average level of pretest and posttest by comparing the difference between pretest and posttest. The results of the N-Gain test in the small-scale test are shown here.

Table 12. Small-Scale N-Gain Test Results

Average Difference	N-Gain	Criterion
43.4	0.7801	Tall

It can be seen in table 12 it indicates that the results of the analysis of the N-Gain test on a small scale indicate that student learning outcomes in science science subjects class V of SDN Ngaliyan 03 have increased. Using a problem-based magic box, for 6 students, an N-Gain value of 0.7801 was obtained, indicating that the value was in the high category.

In the small-scale test, the researcher also distributed a response questionnaire to teachers and students about the food chain's magic box media based on problem-based learning. The assessment instrument consists of seventeen questions with two response options, "yes" and "no." The "yes" option receives a score of one, while the "no" option receives a score of zero. There are four criteria used to assess student and teacher responses: 82%-100% (Very Decent), 63%-81% (Decent), 44%-62% (Moderately Decent), and 25%-43%. (Not Eligible). The results of a small-scale trial on Problem Based Learning Food Chain Magic Box Media are presented below.

Table 13. Results of Student and Teacher Responses to a Small-Scale Trial Regarding the Food Chain Magic Box Media Based on Problem Based Learning

Respondents	Presented%	Criterion
Teacher	100%	Very deserved
Student	100%	

Based on table 13, the results of the questionnaire responses of teachers and students to the food chain magic box media based on problem-based learning, it can be concluded that the food chain magic box media is suitable for use in learning IPAS Food Chain material. This can be proven from the number of scores obtained from the questionnaire is one for each question, so that obtaining a maximum score with a percentage of 100% of the category is very feasible.

Product Revision

Researchers will use these findings as consideration to improve the learning methods that have been made. As shown by the recapitulation of students' responses to the Problem Based Learning-based Food Chain Magic Box media on a small-scale trial, students did not provide criticism or recommendations for media improvement; Instead, they say that the media has an attractive and unique look that can enhance their learning.

The Effectiveness of Trial Use of Food Chain Magic Box Media Based on Problem Based Learning

Trial Use

After a small-scale trial consisting of 6 students in grade V of SDN Ngaliyan 03, a large-scale trial was carried out by involving 26 students of class V of SDN Ngaliyan 05. At this stage, students first work on pretest questions before using magic box media and then, at the end of learning students will do posttest questions to find out changes after using magic box media in learning. The effectiveness of this problem-based magic box media is measured through a comparison of pretest and posttest scores. The results of the study from the large group trial provided data on the impact of the use of food chain magic box media based on problem based leaning on the understanding of social studies of class V students.

It can be seen that the data on the learning outcomes of grade V students of SDN Ngaliyan 05 can be seen in table 14, the use of food chain magic box media based on problem-based learning in IPAS learning shows significant developments. The average increase in

pretest and posttest shows the difference in student learning outcomes before and after using the food chain magic box media.

Table 14. Pretest and Posttest Results in Large-Scale Tests

Test Type	Average	Average Difference
Pretest	44	47
Posttest	91	

The research was supported by researchers conducted by Noer et al. (2023). The use of magic box media can improve science learning outcomes in grade V and increase understanding of the material so that the learning outcomes that are passed are improved. To find out the criteria for increasing the average pretest and posttest, the N-Gain test was carried out by comparing the difference between SMI and pretest. The following are the results of the N-Gain test in the large-scale test.

Table 15. Large-Scale N-Gain Test Results

Average Difference	N-Gain	Criterion
47	0.7801	Tall

According to table 15, a large-scale N-Gain test analysis indicates that the food chain material in the science lesson of class V of SDN Ngaliyan 05 showed better learning outcomes in 26 students. The use of food chain magic box media based on problem-based learning indicates an N-Gain value of 0.7801, which is a value in the high category. Therefore, it can be concluded that the use of problem-based food chain magic box media shows effective learning outcomes in improving student learning outcomes.

After conducting the N-Gain test, the effectiveness and success of the food chain magic box media based on problem-based learning in supporting the IPAS learning process, can also be seen from the responses of teachers and grade V students of SDN Ngaliyan 05 during the large-scale test. The following is a recapitulation of the results of teacher and student responses.

Table 16. Results of Student and Teacher Responses to a Large-Scale Trial on Food Chain Magic Box Media Based on Problem Based Learning

Respondents	Presented%	Criterion
Teacher	100%	Highly Worth It
Student	98%	

Seen in table 16, it is concluded that the media magic box of the food chain obtained a response that is said to be suitable for use in learning IPAS material on the Food Chain. This, can be stated from the number of scores obtained from the questionnaire is 1 for each question, so that the maximum score with a percentage of 100% is included in the very feasible category

The research that is related to this research was conducted by Damayanti (2021), the results illustrate that the Explosion Magic Box learning media was assessed from the responses of teachers and students, the teacher's response was 89% and the student response was 90%. Meanwhile, the value of the feasibility test for use is 97%.

Furthermore, relevant research was also conducted by Islamy et al. (2022). From the obtained results, it was shown that the response of teachers and students obtained an average of 3.81 with the category included in the very good category, while the response to the use questionnaire during the product trial obtained an average score of 3.82 with the very good category. Therefore, this Explosion Magic Box media is worth developing.

So it can be concluded from this study that the use of food chain magic box media based on problem-based learning in social studies learning can improve the learning outcomes of social studies of students of SDN Ngaliyan 05 Semarang City.

Conclusion

The results of this study show that the use of food chain magic boxes based on problem-based learning to teach Food Chain materials can improve students' understanding of the subject matter and improve the learning outcomes of grade V students at SDN Ngaliyan 05. It can be produced through the results of the t-test and the N-Gain test. From the results of the t-test, a Sig. (2-tailed) value of 0.000 with a Sig. (2-tailed) value of < 0.05 which can be explained that there is a significant difference between the results of the pretest and posttest before and after the implementation of the use of problem-based learning-based magic box media. Meanwhile, the results of the N-Gain test obtained an average level percentage of 78.01% classified as high. From the improvement in student learning outcomes, it can be concluded that the use of food chain magic box media based on problem-based learning in class V can significantly improve learning outcomes.

Acknowledgments

Thank you to the Elementary School Teacher Education study program of Semarang State University for providing opportunities for researchers to gain knowledge on this campus. Thank you to the supervisor who has guided the researcher during the research and preparation of the article. Thank you to SDN Ngaliyan 05 for giving researchers the opportunity to conduct research. Thank you to parents, siblings, someone who was present for just a moment and friends for all forms of support.

Author Contributions
M. N. P. A. contributes to conducting research, developing products, analyzing data, and compiling articles. D. W. as a supervisor in research to article preparation.

Funding
This research is a research using personal funds owned by the researcher.

Conflicts of Interest
The author declares that there is no conflict of interest related to the publication of this article.

References

Abdiyah, N. M. L. (2022). *Pengembangan Media Magic Box Berbasis Keterampilan Proses Sains Dalam Materi Ekosistem*. Retrieved from https://jurnal.kopusindo.com/index.php/jtpp/article/view/147

Al-Husseini, S., El Beltagi, I., & Moizer, J. (2021). Transformational leadership and innovation: the mediating role of knowledge sharing amongst higher education faculty. *International Journal of Leadership in Education*, *24*(5), 670–693. https://doi.org/10.1080/13603124.2019.1588381

Ali, M. (2022). Optimalisasi Kompetensi Kepribadian Dan Profesionalisme Guru Pendidikan Agama Islam (Pai) dalam Mengajar. *Ar-Rusyd: Jurnal Pendidikan Agama Islam*, *1*(2), 100–120. https://doi.org/10.61094/arrusyd.2830-2281.27

Anatasya, E., & Dewi, D. A. (2021). Mata Pelajaran Pendidikan Kewarganegaraan sebagai Pendidikan Karakter Peserta Didik Sekolah Dasar. *Jurnal Pendidikan Kewarganegaraan Undiksha*, *9*(2), 291–304. https://doi.org/10.23887/jpku.v9i2.34133

Anggita, F., & Nisa Lubis, K. (2023). Pengaruh Game Based Learning (GBL) Terhadap Kemampuan Berpikir Kritis Siswa Pada Mata Pelajaran IPA di SDN 060811 MEDAN. *Didaktik : Jurnal Ilmiah PGSD STKIP Subang*, *8*(2), 2816–2826. https://doi.org/10.36989/didaktik.v8i2.585

Anwar, N. T. (2018). Peran Kemampuan Literasi Matematis pada Pembelajaran Matematika Abad-21. *PRISMA, Prosiding Seminar Nasional Matematika*, *1*, 364–370. Retrieved from https://journal.unnes.ac.id/sju/prisma/article/download/19603/9527

Apritama, F., Fau, D., & Aznam, N. (2023). Stude nt ' s Attitude Towards the Use of Video Podcast for Learning Buffer Solutions. *Jurnal Penelitian Pendidikan IPA*, *9*(9), 6911–6917. https://doi.org/10.29303/jppipa.v9i9.330

Borg, W. R., & Gall., M. D. (1998). *Educational Research: An Introduction*. Pearson Education Inc. Boston.

Damayanti, F. (2021). Pengembangan media pembelajaran explosion box subtema energi alternatif untuk melatih keterampilan berpikir siswa. *P-Semart Journal*, *1*(3), 8–14. Retrieved from https://edu.journal.pgriprovinsijawatimur.org/index.php/psemart/article/view/21

Dinata, A., & Fauzi, M. A. (2024). Perbedaan Peningkatan Kemampuan Representasi Matematis Siswa PBL Berbantuan Geogebra dan DL Di Kelas X SMA. *Jurnal Riset Rumpun Matematika Dan Ilmu Pengetahuan Alam*, *3*(1), 270–284. Retrieved from https://doi.org/10.55606/jurrimipa.v3i1.2494

Dunne, G. (2023). Epistemic injustice in education. *Educational Philosophy and Theory*, *55*(3), 285–289. https://doi.org/10.1080/00131857.2022.2139238

Fadilah, A., Nurzakiyah, K. R., Kanya, N. A., Hidayat, S. P., & Setiawan, U. (2023). Pengertian Media, Tujuan, Fungsi, Manfaat dan Urgensi Media Pembelajaran. *Journal of Student Research (JSR)*, *1*(2), 01–17. https://doi.org/10.55606/jsr.v1i2.938

Faiz, A., & Purwati. (2021). Peran Filsafat Progresivisme dalam Mengembangkan Kemampuan Calon Pendidik di Abad-21. *Jurnal Education and Development*, *9*(1), 131–135. https://doi.org/10.37081/ed.v9i1.2308

Festiyed, Daulay, H., & Ridhatullah, M. (2023). Influence of Interactive Multimedia Teaching Materials on Cognitive Learning Outcomes of Students in Science Lessons: A Meta-Analysis. *Jurnal Penelitian Pendidikan IPA*, *9*(8), 387–396. https://doi.org/10.29303/jppipa.v9i8.2693

Islamy, C., & Suputra, I. N. (2022). Pengembangan Media Pembelajaran Explosion Box pada Mata Pelajaran Korespondensi untuk Meningkatkan Hasil Belajar Peserta Didik. *Jurnal Pendidikan Administrasi Perkantoran (JPAP)*, *10*(1), 1–15. https://doi.org/10.26740/jpap.v10n1.p1-15

Istyadji, M., Yulinda, R., Amalina, D., & Fahmi. (2022). Validity and Practicality of Articulate Storyline Learning Media on Environmental Pollution Materials for Junior High School Students. *Jurnal Penelitian Pendidikan IPA*, *8*(6), 2599–2604. https://doi.org/10.29303/jppipa.v8i6.1639

Lestari, A., & Aryaningrum, K. (2024). Pengembangan Media Borama (Box Rantai Makanan) Pada Pembelajaran IPA Kelas 5 SD. *Jurnal Teknologi Pendidikan Dan Pembelajaran (JTPP)*, *1*(4), 675–680. Retrieved from https://jurnal.kopusindo.com/index.php/jtpp/article/view/147

Mantoviana, T., Advinda, L., Chatri, M., & Putri, D. H. (2023). Development of Interactive Multimedia Learning Science-Biology Using Macromedia Flash 8 for Class VIII Students of SMPN 34 Padang. *Jurnal Penelitian Pendidikan IPA*, *9*(12), 10602–10609.

https://doi.org/10.29303/jppipa.v9i12.5028

Melindawati, S., & Alfiyandri. (2023). Development Learning Media Interactive Powerpoint Integrated Thematic Learning. *Jurnal Penelitian Pendidikan IPA*, *9*(10), 8439–8445. https://doi.org/10.29303/jppipa.v9i10.5474

Monhartini, M., Razak, A., Irdawati, I., & Putri, D. H. (2023). Development of Sparcol Videoscribe-Based Learning Videos for Students. *Jurnal Penelitian Pendidikan IPA*, *9*(6), 4578–4587. https://doi.org/10.29303/jppipa.v9i6.3123

Muchith, M. S. (2016). Radikalisme Dalam Dunia Pendidikan. *ADDIN*, *10*(1), 163. https://doi.org/10.21043/addin.v10i1.1133

Nieto-Márquez, N. L., Baldominos, A., & Pérez-Nieto, M. Á. (2020). Digital Teaching Materials and Their Relationship with the Metacognitive Skills of Students in Primary Education. *Education Sciences*, *10*(4), 113. https://doi.org/10.3390/educsci10040113

Noer, A. D., Maisaroh, S., Aini, Q., & Setyawan, A. (2023). Penggunaan Media Magic Box untuk Meningkatkan Hasil Belajar IPA pada Siswa Kelas V MIN 1 Bangkalan. *Journal on Education*, *6*(1), 3449–3456. https://doi.org/10.31004/joe.v6i1.3401

Ong, S. G. T., & Quek, G. C. L. (2023). Enhancing teacher–student interactions and student online engagement in an online learning environment. *Learning Environments Research*, *26*(3), 681–707. https://doi.org/10.1007/s10984-022-09447-5

Pramasdyasari, A. S., Aini, S. N., & Setyawati, R. D. (2024). Enhancing Students' Mathematical Critical Thinking Skills through Ethnomathematics Digital Book STEM-PjBL. *Mosharafa: Jurnal Pendidikan Matematika*, *13*(1), 97–112. https://doi.org/10.31980/mosharafa.v13i1.1979

Raaijmakers, S. F., Baars, M., Schaap, L., Paas, F., van Merriënboer, J., & van Gog, T. (2018). Training self-regulated learning skills with video modeling examples: Do task-selection skills transfer? *Instructional Science*, *46*(2), 273–290. https://doi.org/10.1007/s11251-017-9434-0

Repelita, T., Sadiah, T. L., & Prihamdan, D. (2023). Development of Science Learning Video Media to Increase Elementary School Students' Interest in Learning. *Jurnal Penelitian Pendidikan IPA*, *9*(9), 7367–7372. https://doi.org/10.29303/jppipa.v9i9.4391

Satifa, A., Dewi, N. K., & Nurwahidah. (2023). Media Pembelajaran Kotak Ekosistem pada Pembelajaran IPA di Kelas V Sekolah Dasar. *Jurnal Educatio*, *9*(4), 2078–2085. https://doi.org/10.31949/educatio.v9i4.5691

Setyosari, H. P. (2016). *Metode Penelitian Pendidikan & Pengembangan*. Prenada Media.

Sudjana, N., & Rivai, A. (2019). *Media Pembelajaran (Penggunaan dan Pembuatannya)*. SBAIgensindo.

Sukmadinata, N. S. (2017). *Pengembangan kurikulum: Konsep, teori, dan praktik* (2nd ed.). Jakarata: Remaja Rosdakarya.

Sumonja, M. (2023). Computational thinking in education - epistemology, pedagogy and politics. *Sociologija*, *65*(1), 136–156. https://doi.org/10.2298/SOC220401005S

Sungur, S., & Tekkaya, C. (2006). Effects of Problem-Based Learning and Traditional Instruction on Self-Regulated Learning. *The Journal of Educational Research*, *99*(5), 307–320. https://doi.org/10.3200/JOER.99.5.307-320

Susanto, L. H., Rostikawati, R. T., Novira, R., Sa'diyah, R., Istikomah, I., & Ichsan, I. Z. (2022). Development of Biology Learning Media Based on Android to Improve Students Understanding. *Jurnal Penelitian Pendidikan IPA*, *8*(2), 541–547. https://doi.org/10.29303/jppipa.v8i2.1334

Veryawan, V., Tan, M., & Syarfina, S. (2021). Kegiatan Bermain Kotak Ajaib (Magic Box) Dalam Upaya Meningkatkan Kemampuan Sains Anak Usia Dini. *Yaa Bunayya*, *5*(1), 44–52. https://doi.org/10.24853/yby.5.1.44-52

Wardana, D. K., & Adlini, M. N. (2022). Pengembangan Video Pembelajaran Berbasis Animasi Materi Sistem Respirasi Kelas XI SMA. *Jurnal Penelitian Pendidikan IPA*, *8*(3), 1301–1307. https://doi.org/10.29303/jppipa.v8i3.1641

Wardani, N. W., Kusumaningsih, W., & Kusniati, S. (2024). Analisis Penggunaan Media Pembelajaran terhadap Hasil Belajar Siswa Sekolah Dasar. *Jurnal Inovasi, Evaluasi Dan Pengembangan Pembelajaran (JIEPP)*, *4*(1), 134–140. https://doi.org/10.54371/jiepp.v4i1.389

Wirantini, N. P. N., Astawan, G., & Gede Margunayasa, I. (2022). Media Pembelajaran berbasis Multimedia Interaktif pada Topik Siklus Air. *Jurnal Edutech Undiksha*, *10*(1), 42–51. https://doi.org/10.23887/jeu.v10i1.46558

Zirawaga, V. S., Olusanya, A. I., & Maduku, T. (2017). Gaming in Education: Using Games as a Support Tool to Teach History. *Journal of Education and Practice*, *8*(15), 55–64. Retrieved from https://eric.ed.gov/?id=EJ1143830