Journal of Practice Learning and Educational Development
https://digitalpress.gaes-edu.com/index.php/jpled
E-ISSN: 2809-1205
Vol 5, No. 4 (2025) 1519-1530
DOI: 10.58737/jpled.v5i4.837

Submitted: 01-09-2025
Revised: 20-11-2025
Accepted: 29-11-2025

Development of Canva-Based Herama Interactive Media With Quantum Teaching to Improve Elementary School Student Learning Outcomes

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Abstract

This study confirmed that the development of HERAMA (Harmoni Ekosistem Rantai Makanan), an interactive learning media based on Canva and supported by the Quantum Teaching model, is highly feasible, practical, and effective for elementary school science learning. The validation results from material experts (91.6%) and media experts (91.2%) placed HERAMA in the "very valid" category, while students' responses (≥95% positive) and teachers' feedback indicated that the media was practical and engaging in classroom use. The effectiveness of HERAMA was strongly supported by statistical results, showing a significant increase in the mean score from 56.2 in the pretest to 85.4 in the posttest, with classical mastery improving from 16.7% to 91.7%. The N-Gain score of 0.738 further confirmed a high level of learning improvement. Compared with previous studies, this research not only supports earlier findings that interactive media and Quantum Teaching can enhance motivation and engagement but also provides new evidence on the quantitative effectiveness of Canva-based learning media for science concepts. HERAMA offers contextual, fun, and technology-oriented learning, aligned with the principles of the Merdeka Curriculum and the demands of 21st-century education. Therefore, HERAMA can serve as an innovative alternative for improving both motivation and conceptual understanding in IPAS, especially food chain learning.

Keywords: interactive Media, Canva, Quantum Teaching, Science Education

Introduction

Education is the primary foundation for developing knowledgeable, skilled, independent, and responsible individuals. It is implemented with careful planning to produce high-quality human resources. Education is not only a means to overcome underdevelopment, but also a path out of poverty and ignorance. In line with the national education goals as stated in Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System, education is expected to develop the potential of students to become people of faith, piety, noble character, health, knowledge, skill, creativity, independence, and democratic and responsible citizens. The government has consistently strived to improve the quality of education in Indonesia, through improvements in teacher and student quality, facilities and infrastructure, and curriculum. One strategy currently emphasized is the use of technology

in the learning process. This aligns with the needs of 21st-century education, which demands that students excel not only academically but also possess critical thinking, creativity, and collaborative skills, as well as digital literacy. The implementation of the Independent Curriculum (Curriculum Merdeka) is one of the government's strategic steps to address these challenges. This curriculum provides teachers with greater flexibility in selecting teaching materials tailored to student characteristics and emphasizes contextual, experiential, and in-depth intracurricular learning.

The Natural and Social Sciences (IPAS) subject is part of the Merdeka Curriculum innovation, integrating basic science and social studies concepts. In phase C (grades IV–VI of elementary school), IPAS is aimed at helping students understand the interrelationships between living things, the environment, and social phenomena in everyday life. IPAS learning is not intended solely for memorization, but also to foster curiosity, critical thinking skills, and problem-solving abilities based on real-life experiences. However, reality in the field shows that IPAS learning often takes place conventionally, focusing on lectures and emphasizing memorization. As a result, students are less actively involved, participate less actively, and understand the concepts less than optimally.

Observations at SD Negeri 1 Pagentan and SD Negeri 2 Sokaraja reinforce this issue. Science lessons, particularly those focused on the food chain, still utilize minimal technology, and teachers predominantly use conventional methods. Of the 39 students, 20 (51.28%) failed to achieve the Learning Objective Completion Criteria (KKTP) of a minimum score of 70, resulting in a learning completion rate of only 48.72%. This fact indicates a gap between the expectations of the Independent Curriculum and the learning conditions on the ground.To address these challenges, interactive learning media is a crucial solution. Media serves as a medium for conveying learning messages, thereby increasing student attention, motivation, and understanding (Wulandari et al., 2021). The government also emphasized the importance of utilizing ICT through Ministerial Regulation No. 22 of 2016 concerning Elementary and Secondary Education Process Standards, which mandates the use of technology-based media according to material needs.

One potential digital platform is Canva. Canva makes it easy for teachers to design visual, engaging, and accessible learning media. Research by Hapsari & Zulherman (2021) shows that Canva-based animated video media can improve motivation and science learning outcomes in elementary school students. Research by Ganes Sekar Wangi & Imam Bukhori (2023) also proves Canva's effectiveness, with very high expert validation results and significant improvements in student understanding. Canva not only helps teachers present material in a varied way but also provides a fun learning experience and encourages student creativity (Sholeh et al., 2020; Hadi et al., 2021).

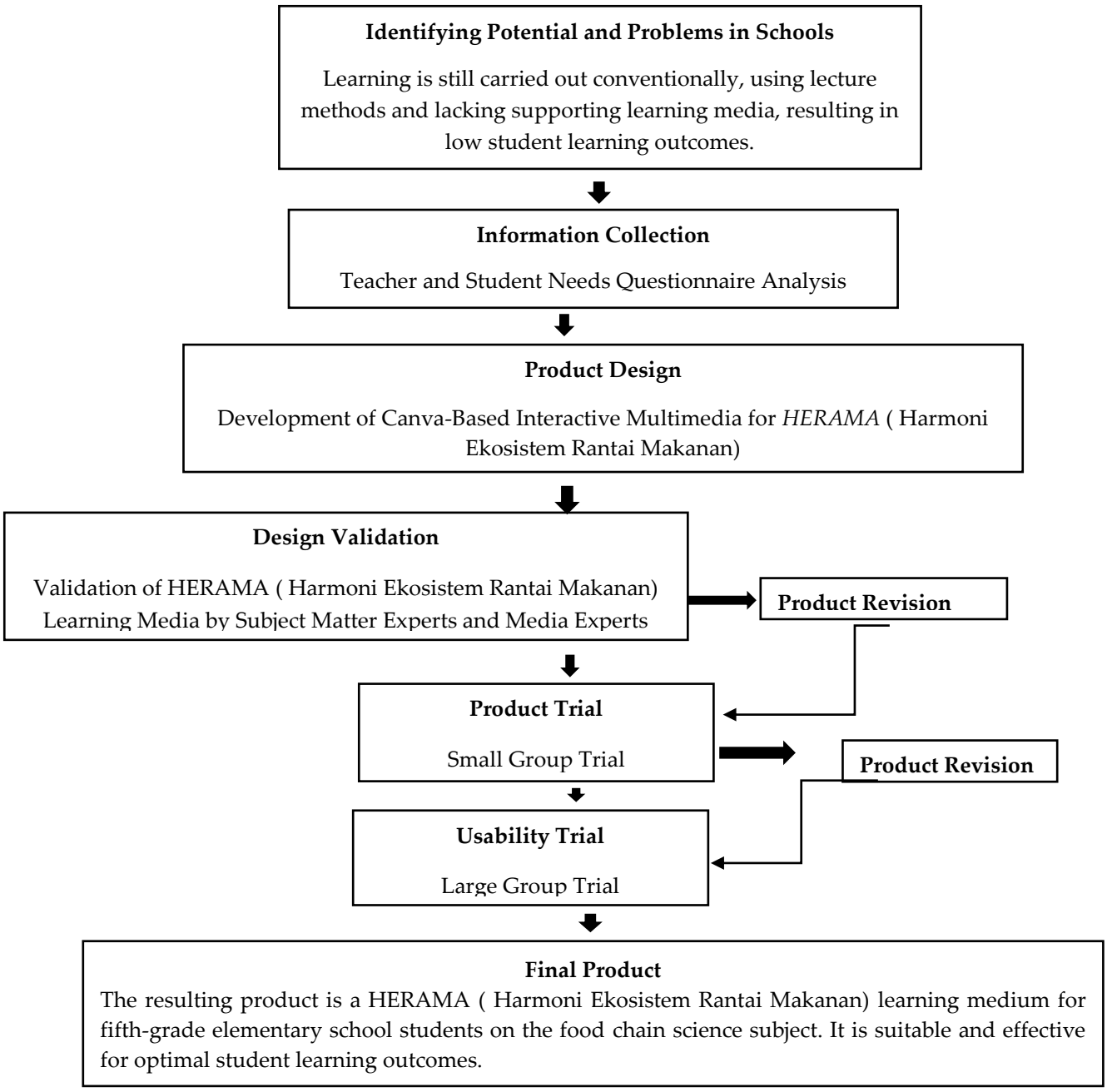
Besides media, learning success is also determined by the learning model. One relevant model is Quantum Teaching, an approach that emphasizes full student engagement through a fun, contextual, and meaningful learning environment. Quantum Teaching utilizes the TANDUR syntax (Grow, Experience, Name, Demonstrate, Repeat, Celebrate) as a systematic learning stage. Research by Mustakim et al. (2023), Widiyono (2021), and Siahaan et al. (2020) shows that Quantum Teaching is effective in improving learning outcomes, student engagement, and teacher creativity.

Based on the description, this research focuses on the development of Canva-based interactive media HERAMA (Harmony of the Food Chain Ecosystem) using the Quantum Teaching model for fifth-grade elementary school science. The urgency of this research lies in the effort to provide interactive, contextual learning media that supports 21st-century learning. HERAMA products are expected to provide a fun learning experience, motivate students, and enhance their understanding of the food chain concept in depth.

Methods

This study uses a Research and Development (R&D) approach adapted from the Borg & Gall model . This model was chosen because it is suitable for analyzing needs, designing, developing, and testing the effectiveness of educational products systematically. The product developed is the Canva-based interactive media HERAMA (Harmony of the Food Chain Ecosystem) with the application of the Quantum Teaching learning model in the fifth grade elementary school science subject. This type of research is categorized as non-experimental quantitative research, because it focuses on product development while testing the effectiveness of its use. According to Sugiyono (2016), the R&D method not only produces products, but also tests their feasibility and effectiveness so that they are truly useful in learning practices.

HERAMA Interactive Media Development Flow



Research Instruments and Data Collection Methods

Data collected	Instruments used	Collection techniques
Feasibility of interactive learning media	Expert validation questionnaire	The questionnaire was given to expert validators, analyzed using the percentage formula (Purwanto, 2016) with the criteria of passability if the score is ≥ 76%.
Student and teacher responses to media	Questionnaire response students and teachers	The questionnaire was given directly to students and teachers after using the media.
Learning outcomes student	Learning outcome test (pretest and posttest)	Written tests given to students before and after learning
Validity instrument learning	Grid indicator learning	Content validity analysis based on indicator grid
Validity grains question	Test results study , analysis point biserial correlation	Test the validity of test items using point biserial correlation
Reliability test results Study	Learning outcome test, KR-20 analysis	Reliability test with the KR-20 formula

Quantitative data from expert validation results, student responses, and learning outcomes were analyzed descriptively quantitatively, while the effectiveness of the media was tested by comparing pretest and posttest scores through normality tests using Shapiro–Wilk , different tests with paired sample t-test, and learning improvement tests with N-gain . The N-gain criteria were categorized as high (≥ 0.70), medium (0.30–0.70), and low (<0.30). Qualitative data in the form of teacher interviews and observations of the learning process were used to strengthen the findings of the trial results.

Results and Discussions

1. Results

The development of interactive media HERAMA (Harmony of the Food Chain Ecosystem) is designed to facilitate the learning process of science, especially on the food chain material in fifth grade of elementary school. The design of the HERAMA media development refers to the principles of Quantum Teaching which emphasizes the active involvement of students through fun, meaningful, and contextual learning experiences. In addition, the use of the Canva application was chosen because it has high flexibility in presenting designs rich in color, illustrations, animations, and multimedia integration.

In a way detailed , design HERAMA includes :

a. Initial Display (Home Page)

The first page displays the title " HERAMA – Harmony of the Food Chain Ecosystem" with colorful illustrations of ecosystems such as trees and animals. The initial design is simple yet engaging, so students are immediately drawn to explore the content. This page also features a navigation button to the Main Menu, with an interactive icon in the form of a picture (the "next" button).

b. Main course

The main menu is designed like a navigation bar, featuring large icons in contrasting colors for easy viewing by students. The main menu consists of several options:

The HERAMA interactive media design was developed to support fifth-grade science learning on the food chain topic with a fun, easy-to-understand approach that encourages active student involvement. The core competencies are designed to enable students to explain the concept of a food chain, recognize the roles of producers, consumers, and decomposers, and create examples of simple food chains. The material is presented through simple text, images, and energy flow charts to make the concept more concrete, complemented by icebreakers in the form of relevant songs to maintain learning enthusiasm. In addition, interactive quizzes in the form of simple games are provided to provide direct feedback and build student confidence. Teachers also provide motivation by emphasizing the importance of maintaining ecosystem balance, while evaluation is carried out through multiple-choice questions and short essays to assess learning outcomes. With this design, HERAMA is expected to be able to provide an active, fun, and meaningful learning experience.

c. Presentation of Material

The material in HERAMA is designed to be concise, communicative, and contextual. The language used is simple and tailored to the cognitive developmental level of elementary school students. Text is presented in large font sizes, contrasting colors, and a clean layout for easy reading.

Main material includes:

1) Introduction containing an explanatory video about the rice field ecosystem

2) Food chain components containing biotic and abiotic components, the meaning and function of the food chain.

3) Food Chain Process (producers, consumers, decomposers).

4) Example chain food in the ecosystem forests , rivers , lakes , seas , and deserts .

Every part material equipped picture illustration colorful , interactive diagrams , and example real close with life students , for example chain food simple in the rice fields (rice → grasshopper →frog →snake).

d. Animation and Audio Narration

To facilitate understanding, the material is complemented by interactive animations showing the flow of energy from producers to consumers to decomposers. These animations are supported by audio narration with child-friendly voices, allowing students to learn through a combination of text, images, sound, and movement. This aims to accommodate students with different learning styles (visual, auditory, and kinesthetic), so that all students can understand the material more easily.

HERAMA Media provides short 3–5-minute videos that showcase real-life examples of food chains in various ecosystems. The videos are accompanied by simple, explanatory narratives and supporting text (subtitles) for easier understanding. These videos aim to provide a more realistic and contextual learning experience, enabling students to connect theory to the phenomena around them.

e. Interactive Quiz

The quiz on HERAMA is presented in the form of a fun game, with an illustrated multiple choice model → students choose answers based on food chain illustrations.

Quiz results are displayed live as scores or points, providing students with instant feedback. With this model, quizzes serve not only as evaluation but also as a means of learning through play (fun learning).

f. Reflection and Conclusion

At the end, there is a learning reflection in the form of open questions, for example:

1) "What did you learn today about the food chain?"

2) "Why is maintaining ecosystem balance important?"

This reflection aims to encourage students to think critically while instilling values of environmental concern. It concludes with a conclusion.

The research results show that the Canva -based HERAMA interactive media with the Quantum Teaching model received excellent ratings from the validators. Subject matter experts gave an average score of 91.6%, while media experts gave an average score of 91.2%. Both results place HERAMA in the "very appropriate" category. Revisions were minor, such as separating objectives and material menus in the initial stage and adding formative assessment questions to more accurately measure the achievement of learning objectives.

Summary Table of Material Validation Results

Total Score	44
Maximum Score	48
Research result	91.6%
Criteria	Very worthy (A) Description: Suitable for field testing with revisions as suggested.

Media Validation Results Summary Table

Total Score	125
Maximum Score	136
Research result	91.2%
Criteria	Very worthy (A) Description: Suitable for field testing with revisions as suggested.

In a small-scale trial involving 12 fifth-grade students at SDN 02 Sokaraja, HERAMA media was proven to significantly improve learning outcomes. The average pretest score for students was only 55.8, with a learning completion rate of 16.7%. After learning using the media, the average posttest score increased to 85.2, with a completion rate of 83.3%. The student response questionnaire also showed positive results with a percentage of 95.8%, so the media was declared very interesting, easy to understand, and suitable for use in learning.

Small-Scale Trial Assessment Results Table

No.	Information	Product Trial Class	
		Pretest	Posttest
1.	Amount Student	12	12
2.	Average value	55.8	85.8
	Lowest value	40	65
	highest score	70	100
	Amount student complete	2	10
	Amount student No complete	10	2
	Average KKTP (%)	16.7%	83.3%
	Increase (%)	66.6%	

Questionnaire Results Response Product Trial Students Small Group

Recipient Code	1	2	3	4	5	6	7	8	9	10
SW 1	√	v	v	v	v	√	√	√	√	√
SW 2	√	√	√	√	√	√	√	√	√	√
SW 3	√	√	√	√	√	√	√	√	√	√
SW 4	√	√	√	√	√	√	√	√	√	√
SW 5	√	√	√	√	√	√	√	√	√	√
SW 6	√	√	√	√	√	√	√	√	√	√
SW 7	√	√	√	√	√	√	√	√	√	√
SW 8	√	√	√	√	√	√	√	√	√	√
SW 9	√	√	√	√	√	√	√	√	√	√
SW 10	√	√	√	√	√	√	√	√	√	√
SW 11	√	√	√	x	√	√	x	x	√	√
SW 12	√	x	√	x	√	√	√	√	√	√
Total score per number	12	11	12	10	12	12	11	11	12	12
Amount score	115									
Presentation	95.8%									
Category	Very Worthy									

Stage next is a trial scale large involving 24 students fifth grade students of SDN 1 Pagentan . At this stage, item analysis was conducted to ensure the validity and reliability of the instrument. Of the 50 items tested, 42 were declared valid, while the item reliability coefficient was 0.87, which is considered very high. This confirms that the assessment instrument used in the study has met the criteria for good quality.

Analysis Results Reliability of Trial Questions

N	r_{hitung}	r_{tabel}	conclusion	criteria
24	0.87	0.404	Reliable (Very high)	Tall

Seen improvement results Study students on trial scale big also shows consistent results positive . The questionnaire obtained a percentage between 91.6% and 100%, categorized as very appropriate. In terms of learning outcomes, the average pretest score for students was only 56.2 with a mastery score of 16.7%. After implementing HERAMA media, the average posttest score increased to 85.4 with a learning mastery score of 91.7%. This increase proves that HERAMA media is effective in helping students understand the concept of the food chain.

Pretest Posttest Table of Trial Class

No.	Information	Product Trial Class	
		Pretest	Posttest
1.	Amount Student	24	24
2.	Average value	56.2	85.4
	Lowest value	32	65
	highest score	78	98
	Amount student complete	4	22
	Amount student No complete	20	2
	Average KKTP (%)	16.7%	91.7%
	Increase (%)	75%	

Shapiro-Wilk normality test showed that the data were normally distributed with a significance value above 0.05. Furthermore, the t-test produced a calculated t = 42.18, which was greater than the t-table = 2.064, thus concluding that there was a significant difference between student learning outcomes before and after using HERAMA media.

Results of the Normality Test of Pretest and Posttest Data (Shapiro-Wilk)

Data	Average	Division Standards	Shapiro-Wilk Statistics	p-value	Information
Pretest	56.2	6.26	0.971	0.702	Normal
Posttest	85.4	5.18	0.973	0.752	Normal

T-test Results of Average Pretest and Posttest Scores

T Count	T Table	α	Information
42.18	2,064	5%	Ha accepted

Furthermore, the effectiveness test using N-Gain showed a score of 0.738, which is considered high. This means that HERAMA media is not only suitable for use but also effective in significantly improving student learning outcomes. Therefore, HERAMA's interactive media, based on Canva and the Quantum Teaching model , has been proven to provide a more engaging and interactive learning experience, aligned with the needs of 21st-century learning.

Table of N-Gain Test Results for Large-Scale Pretest and Posttest Values

Pretest Average	Posttest Average	Difference between Posttest and Pretest averages	N-Gain	Criteria
56.2	85.4	29.2	0.738	Tall

2. Discussions

The results of the study showed that the Canva-based HERAMA interactive media with the Quantum Teaching model proved effective in improving students' understanding of the food chain concept. This was evident from the increase in students' average score from 56.2 (pretest) to 85.4 (posttest), with classical completeness increasing from 16.7% to 91.7%. This significant increase was further strengthened by statistical analysis, where the calculated t (42.18) was higher than the t table (2.064) and the N-Gain score of 0.738 was in the high category. These results prove that the use of HERAMA is able to address the initial problems of low student learning outcomes and the lack of use of digital media in science learning.

These findings are consistent with previous research. Fitri & Adnan (2021) and Nurhaty (2021) found that the application of interactive media can increase student engagement and improve science learning outcomes. Widiyono's (2021) research also demonstrated the effectiveness of Quantum Teaching in improving understanding of science concepts, with a significant increase in average grades. Similarly, Khasanah et al. (2022) emphasized that the combination of digital media with Quantum Teaching not only increases motivation but also provides a more meaningful learning experience. Therefore, this research strengthens the evidence that integrating Canva digital media with Quantum Teaching is a relevant learning strategy in the digital era.

In addition to supporting previous research, these results also provide a new contribution. While previous research focused more on student motivation and engagement, this study quantitatively demonstrates the effectiveness of HERAMA in improving learning outcomes with a high N-Gain rating. This demonstrates that HERAMA is not only visually appealing but also has a direct impact on improving mastery of the food chain concept.

From the researcher's perspective, HERAMA's success is due to several factors. First, the interactive design, which combines illustrations, animations, and simple games, makes it easier for students to understand the abstract flow of the food chain. Second, the Quantum Teaching approach provides a fun and contextual learning experience, making students feel more engaged. Third, this media integration aligns with the principles of the Independent Curriculum, which emphasizes active, adaptive, and technology-based learning (Kemendikbudristek, 2022a; Rahmadayanti & Hartoyo, 2022). Therefore, it can be emphasized that HERAMA has the potential to be an alternative, innovative, and appropriate social studies learning medium for 21st-century education.

Conclusion

Based on the research that has been conducted and the discussion described, it can be stated that the HERAMA interactive media developed based on Canva with the Quantum Teaching approach has a design that suits the needs of students and teachers, characterized by an attractive, interactive appearance, and is relevant to 21st-century learning. The validation results from material experts (91.6%) and media experts (91.2%) show a very feasible category, reinforced by positive responses from students ≥95% and teachers who consider the media practical to use, thus proving the practicality of HERAMA in learning. The effectiveness of the media can be seen from the increase in learning outcomes, where the average student score increased from 56.2 in the pretest to 85.4 in the posttest , classical completeness increased from 16.7% to 91.7%, and the N-Gain score of 0.738 is in the high category. Thus, HERAMA is feasible, practical, and effective to be used as an innovative learning

media that supports the implementation of the Independent Curriculum, increases motivation, and strengthens the understanding of the concept of the food chain for elementary school students.

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