JPPIPA 12(2) (2026)

Jurnal Penelitian Pendidikan IPA

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

Canva-Based RESPIRA Media as an Innovation in Science Learning on the Human Respiratory System in Elementary Schools

Akhmad Sugiarto[1*], Sendi Ramdhani[1], Novi Andri Nurcahyono[2]

[1] Elementary Education Master Program, Graduate School, Universitas Terbuka, Tangerang Selatan, Indonesia.
[2] Bachelor of Elementary School Teacher Education, Faculty of Education, Universitas Negeri Jakarta, Jakarta, Indonesia.

Received: December 15, 2025
Revised: January 18, 2026
Accepted: February 25, 2026
Published: February 28, 2026

Corresponding Author:
Akhmad Sugiarto
akhmadsugiarto91@gmail.com

DOI: 10.29303/jppipa.v12i2.13901

Abstract: This study developed RESPIRA (Respiratory Education System with Process, Interactivity, and Animation), a Canva-based learning media designed to improve fifth-grade students' attention and understanding of the human respiratory system—a challenging topic due to its abstract and complex nature. Using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), the research was conducted at SDN Sumberbendo, Lamongan Regency. Data were collected through expert validation sheets, teacher and student response questionnaires, attention surveys, and pretest-posttest assessments. Descriptive analysis, N-Gain calculations, and Wilcoxon Signed Rank Test were employed to evaluate validity, practicality, and effectiveness. Results indicated high validity (94.4%), excellent practicality ratings from teachers (97.33%) and students (95.76%), and significant effectiveness improvements. Student attention increased from 70.29% (high) to 89.67% (very high), while learning outcomes showed an average N-Gain of 0.71 (high category). The Wilcoxon test revealed significant differences between pretest and posttest scores ($p < 0.001$). RESPIRA media proved valid, practical, and effective for elementary science education, successfully enhancing attention and conceptual understanding through interactive, engaging, and contextually appropriate learning experiences aligned with student characteristics.

Keywords: Canva; Interactive media; Student attention; Concept comprehension; Human respiratory system

Introduction

Students' understanding of the human respiratory system remains low despite educational technology advances. Research by Waruwu et al. (2024) and Setiyowati et al. (2024) shows most students struggle with lung structure, alveoli, and gas exchange mechanisms. Dewi et al. (2021) found misconceptions in 62.15% of students, while Fauziah et al. (2024) reported 83% misunderstood pharynx function. These difficulties stem from the abstract, microscopic nature of respiratory concepts—such as alveolar gas exchange and oxygen-carbon dioxide diffusion—which cannot be directly observed and are challenging for elementary students to visualize without concrete representations (Setiyowati et al., 2024). This persistent low achievement demonstrates that science learning urgently requires concrete, visual, and interactive media to effectively explain abstract physiological processes.

Similar conditions exist at SDN Sumberbendo, Lamongan, where learning media remains predominantly static. Of 24 fifth-grade students, 62.5% struggled with respiratory system material, averaging only 63.3—well below the minimum competency threshold (KKTP) of 75. This poor performance is compounded by low student attention. Attention serves as the foundation for information processing (Slameto, 2010), functioning as a cognitive mechanism enabling

How to Cite:
Sugiarto, A., Ramadhani, S., & Nurcahyono, N. A. Canva-Based RESPIRA Media as an Innovation in Science Learning on the Human Respiratory System in Elementary Schools. *Jurnal Penelitian Pendidikan IPA*, *12*(2), 106-116. https://doi.org/10.29303/jppipa.v12i2.13901

students to absorb and connect information with prior knowledge (Wahyudi & Neviyarni, 2021), and constitutes a critical motivation component (Keller, 2009). The combination of abstract content, static teaching methods, and diminished attention creates significant barriers to meaningful respiratory system learning.

Technology-based media enable engaging, interactive material presentation, particularly in science learning requiring visualization visualization (Maisarah et al., 2023; Wahyudi & Jatun, 2024). Interactive learning media enhance students' attention and conceptual understanding at elementary level (Pagarra et al., 2022). In respiratory system learning, integrating visual, audio, and interactive elements is essential for representing complex concepts (Setiyowati et al., 2024). However, elementary practices remain dominated by one-way methods (Yolanda & Meilana, 2021), making science difficult and boring (Gumilar, 2023), resulting in low motivation and suboptimal comprehension (Amakraw & Kartika, 2022).

Several studies demonstrate Canva's effectiveness in increasing learning motivation and outcomes (Khasanah et al., 2024; Wibowo et al., 2022; and Wulandari & Mudinillah 2022). However, its use has been limited to static visuals without integrated multimedia and intelligent interactive features. While Huda et al. (2025) and Apriyani et al. (2024) emphasize Canva's potential for dynamic media aligned with elementary students' cognitive characteristics, no studies have explored comprehensive integration of animations, interactive quizzes, and AI-powered chatbots within a single Canva-based platform for complex science concepts like the respiratory system.

Therefore, this study develops RESPIRA (Respiratory Education System with Process, Interactivity, and Animation), addressing existing gaps in elementary science education. The novelty lies in: (1) systematically integrating multiple multimedia elements—text, images, audio, animated videos, interactive quizzes, and AI chatbot—into a cohesive Canva-based system for abstract physiological concepts; (2) providing real-time, personalized AI chatbot feedback supporting independent learning; and (3) explicitly applying Mayer's (2009) CTML principles (multimedia, modality, coherence, personalization) to reduce cognitive load and optimize working memory processing.

This research is important because it addresses the pedagogical gap in teaching invisible microscopic processes, responds to the respiratory system comprehension crisis (misconception rates exceeding 60-83%) with an evidence-based solution, democratizes personalized learning support through AI chatbot technology, and establishes Canva as a platform for comprehensive multimedia integration—expanding the potential of accessible, cost-effective digital tools familiar to educators.

The AI chatbot distinguishes RESPIRA by providing adaptive, conversational support transforming passive content consumption into active dialogue. Juanta et al. (2024) show chatbots enhance motivation through personalized interaction, while Fidan et al. (2022) confirm immediate feedback strengthens understanding. By combining intelligent interactivity with theoretically-grounded multimedia design, RESPIRA addresses both cognitive and motivational barriers to learning complex science concepts.

This research focuses on describing Canva-based RESPIRA development and assessing its validity, practicality, and impact on fifth-grade students' attention and respiratory system concept understanding. Theoretically, it contributes to interactive multimedia learning design by demonstrating how CTML principles can be operationalized within accessible digital platforms for complex science content. Practically, results provide educators with a replicable model for developing engaging science media, offer students enhanced learning experiences accommodating diverse needs, strengthen elementary science education quality, and establish a development framework applicable to other abstract curriculum topics.

Method

Research Design

This study employs a Research and Development (R&D) approach aimed at producing a specific product and testing its effectiveness (Sugiyono, 2013). In education, R&D is a systematic process intended to develop and validate educational products, such as learning media, instructional strategies, or evaluation tools (Borg & Gall, 1989). This study applies the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), which enables the systematic and sequential development of learning media to produce products that are valid, practical, and applicable (Weldami & Yogica, 2023). The ADDIE model was selected because it provides structured and systematic stages in learning media development, ranging from needs analysis to product evaluation, making it flexible, easy to implement, and oriented toward users' needs (Safitri & Aziz, 2022).

This research was conducted at SD Negeri Sumberbendo, Mantup District, Lamongan Regency, during the odd semester (May–October) of the 2025/2026 academic year. The school was selected because it has adequate digital-based learning facilities

such as laptops, Chromebooks, tablets, and projectors, thereby supporting the implementation of trials of interactive Canva-based media. Population and Sample: The population of this study comprised all fifth-grade students at SD Negeri Sumberbendo, totaling 84 students distributed across three parallel classes (V-A, V-B, and V-C, each containing 28 students). The research subjects were determined through a two-phase sampling process.

First, Limited Trial (Small Group Trial) was conducted at SD Negeri Ganggangtingan, involving 12 fifth-grade students (6 males, 6 females) selected through purposive sampling to represent diverse academic abilities. Students were categorized based on prior semester science grades: 4 high-achieving students (grades ≥85), 4 medium-achieving students (grades 70-84), and 4 low-achieving students (grades <70). This heterogeneous composition aimed to identify initial technical issues, gather preliminary usability feedback, and assess media functionality across different learning levels. Second, Field Trial (Large Group Trial): Conducted at SD Negeri Sumberbendo, involving 28 fifth-grade students from class V-B (15 males, 13 females) as the main research subjects. Class V-B was selected through cluster random sampling from the three available fifth-grade classes. Selection criteria included: (a) students who had not yet studied human respiratory system material, (b) possession of basic digital literacy skills, and (c) willingness to participate in the research.

Research Design for Measuring Improvement: The study employed a One-Group Pretest-Posttest Design to measure improvement in student attention and learning outcomes before and after using RESPIRA media. This design allows for the assessment of significant improvement within a single group but does not establish causality or demonstrate media superiority due to the absence of a control group. Therefore, the claims in this study are limited to documenting significant improvement in attention and conceptual understanding associated with RESPIRA media use, rather than proving that RESPIRA is superior to other teaching methods. Observed improvements may be influenced by confounding variables such as teacher enthusiasm, novelty effects, or natural maturation.

Data Collection

This study utilized various data collection techniques in accordance with the stages of the ADDIE model. During the needs analysis stage (May 2025), data were obtained through classroom observations to identify teaching methods, teacher and student activities, and responses to learning media, as well as through interviews with teachers and students to explore teaching experiences and media needs. The design stage (June 2025) involved the preparation of research instruments, including validation questionnaires, practicality questionnaires, student attention questionnaires, and pretest and posttest instruments. During the development stage (July–August 2025), expert validation (media, content, and language) was conducted using Likert-scale questionnaires, followed by product revisions based on expert feedback. The implementation stage (a limited trial at SD Negeri Ganggangtingan) employed teacher and student practicality questionnaires, student attention questionnaires administered before and after learning, as well as pretests and posttests to measure comprehension and conceptual improvement. The evaluation stage (October 2025) utilized all data on validity, practicality, attention, and test results to assess the final quality of the RESPIRA media.

Instrument

The instruments in this study were designed to evaluate the quality of the RESPIRA media in terms of validity, practicality, and effectiveness in accordance with the ADDIE stages. Validity instruments consisted of closed-ended Likert-scale (1–5) questionnaires administered to media, content, and language experts to assess visual appearance, curriculum alignment, and language readability; the results were analyzed quantitatively and qualitatively as a basis for product revision. Practicality instruments consisted of teacher and student questionnaires assessing ease of use, efficiency, attractiveness, and the media's contribution to learning, with results categorized as practical. Effectiveness instruments included student attention questionnaires (pre–post) and a learning achievement test consisting of 20 multiple-choice questions analyzed using the N-Gain formula to measure improvements in conceptual understanding. Both effectiveness instruments were validated through content validity testing by competent experts, namely a guidance and counseling (BK) validator for the student attention questionnaire and an elementary school science teacher for the test items.

Data Analysis

Data analysis was conducted to assess the validity and practicality of RESPIRA media. Validity data were obtained from a questionnaire administered to media, materials, and language experts, using a 1–5 Likert scale. The score of each indicator is summed up, then calculated as a percentage with the following formula (Ridwan, 2016):

$$Percentage = \frac{Total\ Score\ Obtained}{Maximum\ Score}\ x\ 100\% \quad (1)$$

Effectiveness analysis was carried out through student attention questionnaires and learning outcome tests (pretest–posttest). The attention questionnaire score is calculated on average, then converted to a percentage using the same formula as the validity test. The result is interpreted using the attention category (0–20% very low, 21–40% low, 41–60% adequate, 61–80% high, 81–100% very high). The learning outcome test was analyzed using the N-Gain test with the formula (Hake, 1998):

$$N - Gain = \frac{(Posttest\ Score - Pretest\ Score)}{(Maximum\ Score - Pretest\ Score)} \quad (2)$$

The N-Gain interpretation categories are high (≥0.7), medium (0.3–0.7), and low (<0.3). In addition, a paired-samples t-test in SPSS was conducted to assess the significance of the difference between pretest and posttest scores. The t-test formula is:

$$t = \frac{\bar{D}}{SD/\sqrt{n}} \quad (3)$$

t = T value calculation
SD = Standard Deviation Difference
n = Number of samples
$\bar{D}$ = Average score difference

The hypothesis of this study is that Canva-based RESPIRA media improve student learning outcomes. In the analysis of the N-Gain test, the null hypothesis is that media use does not increase understanding of science concepts (N-Gain ≤ 0.3), whereas the alternative hypothesis is that it does (N-Gain > 0.3). In the paired-samples t-test, the null hypothesis is that there is no significant difference between pretest and posttest scores. In contrast, the alternative hypothesis states that there is a significant difference, indicating that the RESPIRA media are effective in supporting science learning among 5th-grade students.

Table 1. The Relationship between Problem Formulation, Instruments, and Data Analysis Techniques

Problem Formulation	Research Instruments	Data Analysis Techniques
What is the process of developing RESPIRA media?	Observation sheets, field notes, documentation	Qualitative descriptive
What is the validity of RESPIRA media?	Media validation questionnaire by subject matter experts, media experts, and linguists	Percentage analysis of validity level
How practical is RESPIRA media?	Teacher and student response questionnaire	Practicality percentage analysis
How effective is RESPIRA media?	Student attention questionnaire Pretest and posttest questions	Percentage analysis N-Gain Score T-test

Result and Discussion

Analysis Phase

Observations and interviews at SDN Sumberbendo revealed that science learning media remains limited to textbooks, oral explanations, and static PowerPoints, hindering students' understanding of abstract concepts like the respiratory system. Average test scores of 63.3 with 37.5% classical completeness fall below the minimum standard of 75, underscoring the need for dynamic media that visualizes concepts concretely—the rationale for developing Canva-based RESPIRA.

The Kurikulum Merdeka for 2025/2026 at SDN Sumberbendo, implemented per BSKAP Decree No. 046/H/KR/2025, emphasizes exploration, problem-solving, and meaningful experiences aligned with the Pancasila Student Profile (critical reasoning, creativity, mutual cooperation). However, abstract materials like the respiratory system remain challenging due to media limitations. Canva-based RESPIRA was designed as interactive animation supporting both content mastery and 21st-century skill development.

SDN Sumberbendo possesses adequate digital facilities: 15 Chromebooks, 8 laptops, 10 tablets, 2 projectors, 50 Mbps internet, and student-owned smartphones. This infrastructure supports technology integration and facilitates RESPIRA media trials, enabling optimal research implementation aligned with National Education Standards (Minister of Cultural Education Regulation Number 22 of 2016).

Class V students aged 10–11 years are at a concrete operational stage (Piaget, 1970), able to think logically but still have difficulty understanding abstract concepts. Their concentration range is only 15–20 minutes (Slavin, 2020), so monotonous learning risks lowering focus. Mayer's (2009) multimedia theory emphasizes the effectiveness of the combination of text, images, sound, and animation in processing information. Therefore, interactive media such as RESPIRA are relevant for increasing focus, engagement, and understanding of the respiratory system, in accordance with the demands of the Kurikulum Merdeka.

Design Phase

At this stage, the author prepared learning media design by determining learning objectives, selecting materials, creating storyboards, designing displays, selecting development tools, and designing research

instruments. Development aligns with Learning Outcomes (CP) and Learning Objectives (TP) for fifth-grade science Phase C according to BSKAP Decree Number 046/H/KR/2025. Formulated objectives include students' ability to identify respiratory organs, explain breathing mechanisms (chest and abdomen), analyze effects of unhealthy behaviors, and understand the importance of maintaining respiratory health. Materials were selected from the "Living Beings and Their Environment" element in Kurikulum Merdeka, covering definition, parts, mechanisms, and health maintenance of the respiratory system, sourced from textbooks, scientific journals, and teaching modules.

RESPIRA media was designed with principles of user-friendliness, educational value, and visual appeal, using light blue and white colors, simple icons, and interactive animations to visualize unobservable processes. Navigation includes next, back, and home buttons, plus interactive features such as voice narration, quizzes, and AI-based chatbots adapted to elementary students' characteristics. Canva was chosen for its high accessibility, extensive template library, and ease of design without specialized expertise (Monoarfa & Haling, 2021). Research instruments included expert validation sheets (material and media), teacher and student response questionnaires, concept comprehension tests, and student attention questionnaires to assess content suitability, display quality, practicality level, and improvement in focus and conceptual understanding.

Development Phase

The development stage transformed storyboard designs into an interactive learning media product through creation of visual components, voice narratives, animations, and interactive features, followed by expert validation. RESPIRA was developed using Canva for Education due to its ease of integrating visual, audio, and text elements, applying Mayer's (2009) Cognitive Theory of Multimedia Learning principles—particularly modality, coherence, and contiguity—to ensure harmonious integration of text, sound, and images for enhanced comprehension and retention.

The design implementation arranged page displays according to planned navigation flow, including main menu, competencies, materials, quizzes, entertainment, and closing sections. Sky blue and light green colors create a fresh impression, while contrasting icons and text enhance student recognition. The opening page features the "RESPIRA" title with cartoon-style respiratory organ illustrations, followed by a main menu with interactive icons. Sub-materials (introductions, respiratory processes, organs, and disorders) incorporate simple animations and voice narration. Intuitive navigation buttons enable easy page movement, animation playback, and quiz access, making the media user-friendly and aligned with elementary students' characteristics.

Figure 1. Start page

Figure 2. Main menu page

Figure 3. Nose organ page

Figure 4. Entertainment menu

The introductory submenu presents an animated video from YouTube channel SayaBisa titled "Sistem Pernapasan Manusia: Gimana Sih Cara Manusia Bernapas?" as foundational introduction. The respiratory organs submenu displays anatomical illustrations with iStockphoto animations, featuring a light blue background, bold fonts, and the RESPIRA mascot.

The breathing process submenu offers three options: Pengertian Bernapas (YouTube Isti Winda), Proses Bernapas (YouTube Learning-vi), and Mekanisme Bernapas (YouTube Rumah Belajar Kamil). The respiratory disorders submenu contains: Pendahuluan (YouTube SayaBisa), Gangguan Pernapasan (YouTube Al-Fath School Indonesia), and Cara Memelihara Kesehatan Organ Pernapasan (YouTube Learning Vi).

The entertainment menu includes: Ayo Bernyanyi! (video by Uswatun Hasanah Tanjung) and Cek Paru-Paru Sehat (YouTube FUNTASTIC FOUR). The quiz menu provides Kuis Pemanasan (10 multiple-choice questions) and Kuis Tantangan (easy-medium-difficult levels with automatic scoring). The closing page displays the RESPIRA character with celebratory decorations and motivational narration.

RESPIRA was developed using multiple digital platforms. The mascot was created using Gemini AI and animated in Canva. Voice narration was recorded using ElevenLabs with cheerful intonation. Supporting animations from YouTube channels—Al-Fath School Indonesia (2021), Learning vi (2020), SayaBisa (2018, 2020), Rumah Belajar Kamil (2023), and Uswatun Hasanah Tanjung (2024)—were edited in Canva for Education. The AI chatbot was integrated via CXgenie, configured with elementary-student-friendly language.

After development, the product underwent expert validation in two stages: initial design validation with improvement feedback, and post-revision validation.

Table 2. Pre-Revision (P1) and Post-Revision (P2) Validation Results

Types of Questionnaires	Name of the Validator or Subject	Status	Validation Results	Category	Feedback
Media Expert Validation (25 assessment items)	Dian Setyawan, S.Kom., M.Pd.	Head of the Visual Communication Design Study Program of SMKN 1 Sambeng, Lamongan S2 Educational Technology	$P1 = \frac{112}{125} x\ 100\% = 89.6\%$ $P2 = \frac{123}{125} x\ 100\% = 98.4\%$	Highly feasible	Eliminate the narrative on the first page where there is already a voice narration Transparency and consistency of the background Fix incorrect navigation buttons links
Material Expert Validation (14 assessment items)	Wiwik Wahyu Widyastuti, S.Pd., M.Pd.	School Supervisor at the Lamongan Regency Education Office S2 Elementary Education	$P1 = \frac{55}{70} x\ 100\% = 78.6\%$ $P2 = \frac{55}{70} x\ 100\% = 92.8\%$	Highly feasible	Improve the sequence of the respiratory organs Add an organ image pointer Give quiz feedback
Linguist Validation (10 assessment items)	Ida Fatmawati, S.Pd., M.Pd.	SDN Moronyamplung, Kembangbahu District, Lamongan Regency S2 Indonesian Language and Literature Education	$P1 = \frac{35}{50} x\ 100\% = 70\%$ $P2 = \frac{46}{50} x\ 100\% = 92\%$	Highly feasible	Omit the word "from" in quiz question 1 Make question sentences 4, 7, and 9 more concise and effective Consider additional analytical questions Ensure consistency in the use of commas and periods

After conducting two stages of validation and revision, the researcher published the RESPIRA media to be widely accessible to the public. This publication can be shared through the URL link (https://pernafasan.my.canva.site/respira) or QR code created by the authors.

Implementation Phase

The next step was the implementation of the RESPIRA media in classroom learning. At this stage, a limited trial and a field trial were conducted. The limited trial was carried out to determine the level of practicality of the RESPIRA media and to obtain initial responses from teachers and students toward the developed media. In this trial, the researcher distributed two

different questionnaires to teachers and students. The limited trial was conducted at SDN Ganggangtingan, Ngimbang District, Lamongan Regency, involving 11 5th-grade students and 6 5th-grade teachers from several different elementary schools, and yielded the following results:

Table 3. Practicality Questionnaire

Types of Questionnaires	Subject	Maximum Score	Validation Results	Category
Teacher Response Questionnaire (10 assessment items)	6 V grade teachers from several elementary schools	5x10=50 50x6=300	50+49+49+48+46+50 $P = \frac{292}{300} x\ 100\% = 97.33\%$	Very practical
Student Response Questionnaire (15 assessment items)	11 5th-grade students from several elementary schools	5x15=75 75x15=825	73+75+66+72+72+75+73+75+69+66+74 $P = \frac{790}{825} x\ 100\% = 95.76\%$	Very practical

RESPIRA media is considered 'very practical' by both teachers and students. Teachers found it easy to use without special training, with clear instructions, efficient material delivery, active student engagement, and seamless Kurikulum Merdeka integration. Students found it interesting, easy to use, and helpful for understanding respiratory system material quickly and enjoyably, enabling independent learning without constant teacher reliance.

The field trial assessed RESPIRA's impact on student attention and conceptual understanding. Researchers administered attention questionnaires twice (pre- and post-intervention) and conducted pretest-posttest with 28 fifth-grade students at SDN Sumberbendo Lamongan. Results follow:

Table 4. Student Attention Questionnaire and Pretest-Posttest

Name	Attention Questionnaire		Pretest & Posttest			
	Before (%)	After (%)	Pretest Result	Posttest Result	N-Gain	Category
AF	72	86.67	50	85	0.7	High
AR	84	96	40	80	0.67	Medium
AAP	60	89.33	45	90	0.82	High
ARF	85.33	92	30	85	0.79	High
ARF	76	89.33	40	90	0.83	High
AEM	72	94.67	60	90	0.75	High
AKFA	81.33	93.33	65	95	0.86	High
DPNA	74.67	90.67	40	85	0.75	High
EAAP	72	93.33	50	80	0.6	Medium
FAQ	60	85.33	45	90	0.82	High
HRM	68	88	70	95	0.83	High
KZDS	82.67	93.33	20	75	0.69	Medium
KBK	70.67	80	50	85	0.7	High
MZ	78.67	92	40	80	0.67	Medium
MHA	56	88	60	90	0.75	High
MDA	64	84	65	95	0.86	High
MIKD	68	88	50	80	0.6	Medium
MIF	66.67	92	30	75	0.64	Medium
MTA	69.33	86.67	45	75	0.55	Medium
NFS	62.67	86.67	50	85	0.7	High
NA	85.33	90.67	40	85	0.75	High
NAR	68	92	25	80	0.73	High
NNRW	65.33	92	30	85	0.79	High
PHW	56	86.67	50	80	0.6	Medium
TLA	72	88	40	75	0.58	Medium
ZNA	62.67	94.67	55	75	0.44	Medium
ZAS	70.67	88	40	85	0.75	High
ZAR	64	89.33	55	90	0.78	High
Average	70.29	89.67	45.71	84.29	0.71	High

The student attention questionnaire results show significant improvement: average scores increased from 70.29% (high category) before using RESPIRA to 89.67% (very high category) afterward—a 19.38% increase demonstrating the media's capacity to attract and maintain student focus. Similarly, learning outcomes

improved substantially: average pretest scores of 45.71 increased to 84.29 in posttest, with an average N-Gain of 0.71 (high category), confirming RESPIRA's impact on understanding the human respiratory system.

Following data collection, normality testing was conducted to determine appropriate statistical analysis: Paired Sample t-Test for normally distributed data or Wilcoxon Signed Rank Test for non-normally distributed data.

Table 5. Data Normality Test Results

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.143	28	.152	.971	28	.597
Posttest	.152	28	.097	.916	28	.027

The results of the normality test using Shapiro-Wilk showed that the pretest data had a significance value of 0.597 (> 0.05) so that it can be concluded that the pretest data was normally distributed. Meanwhile, the posttest data has a significance value of 0.027 (< 0.05) which means that the data is not normally distributed. Therefore, this statistical test is continued with the nonparametric Wilcoxon Signed Rank Test.

Table 6. Wilcoxon Signed Rank Test Result

Related-Sample Wilcoxon Signed Rank Test Summary	
Total N	28
Test Statistic	406.00
Standard Error	43.70
Standardized Test Statistic	4.64
Assymptotic Sig (2-sided Test)	<.001

Based on the test results in Table 4.25, the value of Z = 4.645 with Asymp was obtained. Sig. (2-tailed) = < 0.001 (< 0.05), which means that there is a significant difference between the student's pretest and posttest scores. Thus, it can be concluded that RESPIRA media has a strong influence on improving students' understanding of concepts.

Evaluation Phase

RESPIRA media evaluation occurred through formative and summative stages. Formative evaluation included expert validation (media, material, language) conducted in two stages: initial results of 79.4% ("Eligible") increased to 94.4% ("Very Eligible") after revision based on expert feedback. Summative evaluation assessed improvement in students' attention and conceptual understanding after the media was declared suitable. Teacher responses showed very high practicality (97.33%), while student responses reached 95.76%, averaging 96.55% ("Very Practical"). This confirms that Canva-based RESPIRA is valid, practical, and demonstrates significant improvement in science learning.

Overall, formative and summative evaluations show RESPIRA meets three main development aspects: validity, practicality, and improvement evidence. From a Vygotskian perspective, RESPIRA functions as a mediating tool scaffolding students' learning within their Zone of Proximal Development (ZPD), where the AI chatbot provides adaptive support that gradually reduces as students gain mastery, embodying the scaffolding concept of Vygotsky (1978), where knowledgeable assistance enables learners to accomplish tasks they cannot yet perform independently. Thus, RESPIRA serves both as material delivery and interactive media that increases motivation and learning outcomes, with potential for further development in other science materials.

Discussion

Canva-based RESPIRA development using the ADDIE model demonstrates significant improvement in fifth-grade students' attention and science concept understanding. Development proceeded systematically from needs analysis through validation and improvement testing. ADDIE selection is supported by Branch (2009) for its structured approach to developing technology-based products, aligning with elementary students' cognitive development, which requires media to bridge concrete experiences and abstract concepts through enactive, iconic, and symbolic stages (Piaget, 1970; Bruner, 1966).

RESPIRA design references Cognitive Theory of Multimedia Learning (Mayer, 2009), Dual Coding Theory (Paivio, 1986), and Nine Events of Instruction (Gagné, 2005). Integration of text, images, animations, audio, interactive quizzes, and CXgenie-based AI chatbot strengthens interactivity and learning experience. The chatbot supports constructivism and scaffolding theory (Vygotsky, 1978), distinguishing RESPIRA from previous research (Juanta et al. 2024; Saifullah et al. 2024).

Specifically, the AI chatbot operationalizes Vygotsky's scaffolding by providing graduated support: immediate hints for struggling learners, challenging questions for advanced students, and adjusted explanatory complexity—creating a dynamic ZPD adapting to individual trajectories (Wood et al., 1976). RESPIRA's layered structure—from introductory videos to interactive quizzes to AI-assisted problem-solving—mirrors scaffolding where support structures are systematically introduced, utilized, then faded as competence develops (Pea, 2004). Expert validation confirms high feasibility across media, materials, and language (Sugiyono, 2013; Nieveen, 1999), consistent with research on Canva's learning impact (Khasanah et

al., 2024; Wibowo et al., 2022; Wulandari & Mudinillah, 2022).

Practicality testing shows RESPIRA is easy to operate, flexible for face-to-face and online learning, and increases active participation, aligning with Sadiman (2012), Mulyatiningsih (2015), and Munir (2017) on practical learning media characteristics. Regarding improvement, significant conceptual understanding gains from pretest-posttest are supported by CTML theory (Mayer, 2009) and Dale's Cone of Experience (1946). Observed improvements align with Vygotsky's sociocultural theory, where cognitive development occurs through social interaction and cultural tools—RESPIRA serving as both cultural tool (digital technology) and social learning mediator (through teacher facilitation and peer collaboration). The significant attention increase (70.29% to 89.67%) can be interpreted through scaffolding: as students receive appropriate ZPD support, cognitive load is optimized, sustained attention becomes feasible, and deeper engagement with complex content is achieved (van Merriënboer & Sweller, 2005).

RESPIRA presents visual and auditory experiences bridging abstract science concepts to concrete understanding, overcoming boredom and low attention in elementary science learning due to limited visualization and interactivity (Gumilar, 2023; Yolanda & Meilana, 2021). The multimodal scaffolding—combining visual supports, audio narration, animated demonstrations, and responsive AI feedback—creates multiple learning entry points, ensuring diverse learners receive specific mediation needed to progress from assisted to independent performance (Gibbons, 2015).

Conclusion

This study concludes that Canva-based RESPIRA learning media, developed using the ADDIE model and integrating animations, images, text, voice narration, interactive quizzes, and an AI chatbot, is valid (94.4%), practical (97.33% teachers; 95.76% students), and demonstrates significant improvement in fifth-grade students' attention and conceptual understanding of the human respiratory system. Expert validation confirmed high quality across content, design, and language aspects. Summative evaluation revealed significant improvement in student attention from 70.29% (high category) to 89.67% (very high category), and learning outcomes with an average N-Gain of 0.71 (high improvement category), supported by statistically significant pretest-posttest differences (Wilcoxon test: $p < 0.001$). However, the One-Group Pretest-Posttest Design limits claims to demonstrating improvement associated with media use rather than establishing causal superiority over alternative methods. Based on these findings, specific recommendations are offered: (1) teachers should strategically utilize the AI chatbot feature for differentiated scaffolding by directing struggling students to ask clarifying questions and challenging advanced students with deeper inquiries while maintaining facilitative roles; (2) students should actively engage with the chatbot's personalized feedback mechanism during classroom sessions and independent review to clarify misconceptions about abstract concepts like alveolar gas exchange; (3) schools should provide stable internet connectivity, adequate digital devices, and targeted professional development on integrating AI-assisted learning tools within the Kurikulum Merdeka framework; and (4) future research should employ quasi-experimental designs with control groups to establish stronger causal claims, develop offline or hybrid versions to address connectivity limitations, expand RESPIRA's framework to other abstract science topics (circulatory system, photosynthesis), and incorporate Augmented Reality features for enhanced visualization of microscopic structures—thereby transforming RESPIRA into a comprehensive, adaptive digital learning ecosystem aligned with 21st-century educational demands.

Acknowledgments
Thanks to Universitas Terbuka and all parties who have supported this research. May this study be beneficial.

Author Contributions
All authors made substantial contributions to this study. A.S. was responsible for developing the learning materials, collecting and validating field data, conducting the formal analysis, and drafting the manuscript. S.R. contributed to the preparation of the research methodology and ensured consistency between the analysis and the methodological framework. N.A.N. managed data curation, provided research supervision, and assisted with project administration. All authors have reviewed and approved the final version of the manuscript.

Funding
This research received no external funding.

Conflicts of Interest
The authors declare no conflict of interest.

References

AlShaikh, R., Al-Malki, N., & Almasre, M. (2024). The implementation of the cognitive theory of multimedia learning in the design and evaluation of an AI educational video assistant utilizing large language models. *Heliyon*, *10*(3), e25361. https://doi.org/10.1016/j.heliyon.2024.e25361

Amakraw, Y., & Kartika, N. (2022). Strategi implementasi praktikum pembelajaran ilmu

pengetahuan alam untuk siswa sekolah dasar dan menengah. *SEARCH: Science Education Research Journal, 1*(1), 34-41. Retrieved from https://e-jurnal.iainsorong.ac.id/index.php/jaser

Apriyani, T., Yusuf, Y. A., Siregar, M. O., Nuraini, R., & Rahmadani, A. (2024). Pengembangan Media Edukasi Berbasis Video Pembelajaran Animasi Melalui Aplikasi Canva Pada Materi Ipa Siklus Air Kelas V SDN 176 Palembang. *Jurnal Inovasi Pendidikan Kreatif, 5*(4). Retrieved from https://ijurnal.com/1/index.php/jipk

Borg, W. R., & Gall, M. D. (1989). *Educational research: an introduction*. Longman.

Branch, R. M. (2009). *Instructional Design: The ADDIE Approach*. Springer.

Dale, E. (1946). *Audio-visual methods in teaching*. New York: Dryden Press.

Dewi, N. P., Martini, M., & Purnomo, A. R. (2021). Analisis miskonsepsi peserta didik pada materi sistem pernapasan manusia. *Pensa: E-Jurnal Pendidikan Sains*, *9*(3), 422–428. https://ejournal.unesa.ac.id/index.php/pensa/article/view/40331

Fauziah, A. N., Nugraha, A., & Setiadi, P. M. (2024). Analisis miskonsepsi pada materi organ pernapasan manusia di kelas v sdn cibatu. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, *9*(4), 242–256. Retrieved from https://journal.unpas.ac.id/index.php/pendas/article/view/17897

Fidan, M., & Gencel, N. (2022). Supporting the instructional videos with chatbot and peer feedback mechanisms in online learning: the effects on learning performance and intrinsic motivation. *Journal of Educational Computing Research*, *60*(7), 1716–1741. https://doi.org/10.1177/07356331221077901

Gagné, R. M. (2005). *Principles of instructional design*. Thomson Wadsworth.

Gumilar, E. B. (2023). Problematika pembelajaran ipa pada kurikulum merdeka di sekolah dasar/madrasah ibtidaiyah. *Jurnal Pedagogy*, *16*(1), 129–145. Retrieved from https://jurnal.staimuhblora.ac.id/index.php/pedagogy/article/view/159

Huda, A., Sari, L. M., Effendi, H., Giatman, M., Firdaus, & Sukmawati, M. (2025). Canva-based animation comic video media in informatics learning at smp negeri 14 padang. *JOIV : International Journal on Informatics Visualization*, *9*(1), 120. https://doi.org/10.62527/joiv.9.1.3177

Juanta, P., Fa, F., Alexa, H., Andrian, D., & Sesillya Nababan, V. (2024). Analisis pengaruh penggunaan chatbot sebagai asisten pembelajaran AI terhadap motivasi belajar siswa. *Jurnal Inovasi Pendidikan Sains Dan Terapan (INTERN)*, *3*(1), 23–29. https://doi.org/10.58466/intern.v3i1.1557

Keller, J. M. (2009). *Motivational design for learning and performance: The ARCS model approach*. Springer Science & Business Media.

Khasanah, D. M., Masduki, M., & Haryanto, S. (2024). Penerapan Media Pembelajaran Berbasis Canva Untuk Meningkatkan Motivasi Belajar Siswa Pada Pembelajaran Ips. *Khazanah Pendidikan*, *18*(1), 114. https://doi.org/10.30595/jkp.v18i1.21323

Maisarah, Ayudia, I., Prasetya, C., & Mulyani. (2023). Analisis kebutuhan media digital pada pembelajaran ipa di sekolah dasar. *Jurnal Pengajaran Sekolah Dasar*, *2*(1), 48–59. https://doi.org/10.56855/jpsd.v2i1.314

Mayer, R. E. (2009). *Multimedia Learning*. Cambridge University Press.

Monoarfa, M., & Haling, A. (2021). Pengembangan media pembelajaran canva dalam meningkatkan kompetensi guru. In *Seminar Nasional Hasil Pengabdian* (Vol. 10851092). Retrieved from https://ojs.unm.ac.id/semnaslpm/article/view/26259

Mulyatiningsih, E. (2015). *Metode penelitian terapan bidang pendidikan*. Uny Press.

Munir. (2017). *Pembelajaran Digital*. Alfabeta.

Nieveen, N. (1999). *Design approaches and tools in education and training*. Dordrecht: Springer Netherlands.

Pagarra, H., Syawaluddin, A., & Krismanto, W. (2022). *Media pembelajaran*. Makasar: Badan Penerbit UNM.

Paivio, A. (1986). *Mental representations: A dual coding approach*. Oxford University Press.

Piaget, J. (1970). *Science of education and the psychology of the child*. Viking Press.

Ridwan. (2016). *Skala pengukuran variabel-variabel penelitian*. Bandung: Alfabeta.

Sadiman, A. S. (2012). *Media pendidikan: pengertian, pengembangan, dan pemanfaatannya*. Jakarta: PT RajaGrafindo Persada.

Safitri, M., & Aziz, M. R. (2022). Addie, sebuah model untuk pengembangan multimedia learning. *Jurnal Pendidikan Dasar*, *3*(2), 51–59. Retrieved from http://jurnal.umpwr.ac.id/index.php/jpd

Saifullah, S., Yawan, H., Syafitri, N., & Nurhaliza, S. (2024). Integrating ai chatbot into learning management system: enhancing student engagement and learning outcomes. *Dharmas Education Journal (DE_Journal)*, *5*(2), 1346–1359. https://doi.org/10.56667/dejournal.v5i2.1605

Setiyowati, Y., Sahari, S., & Widodo, A. (2024). Analisis kebutuhan media sipasia (sistem pernapasan manusia) berbasis multimedia interaktif pada pembelajaran ipas di sekolah dasar. *SEMDIKJAR*

(Seminar Nasional Pendidikan Dan Pembelajaran), 1271–1277. Retrieved from https://proceeding.unpkediri.ac.id/index.php/semdikjar/article/view/5341

Slameto. (2010). *Belajar dan faktor-faktor yang mempengaruhinya*. Rineka Cipta.

Sugiyono. (2013). *Metode penelitian pendidikan pendekatan kuantitatif, kualitatif dan r&d*. Bandung: Alfabeta.

Vygotsky, L. S. (1978). *The development of higher psychological processes*. Harvard University Press.

Wahyudi, I., & Neviyarni. (2021). Analisis terhadap perhatian dan belajar perseptual dalam aktivitas belajar siswa. *Edukatif : Jurnal Ilmu Pendidikan*, *3*(1), 124–134. https://doi.org/10.31004/edukatif.v3i1.231

Wahyudi, N. G., & Jatun. (2024). Integrasi teknologi dalam pendidikan: tantangan dan peluang pembelajaran digital di sekolah dasar. *Indonesian Research Journal on Education*, *4*(4), 444–451. Retrieved from https://www.irje.org/irje/article/view/1138/812

Waruwu, S. M., Zega, L. A., & Lase, N. K. (2024). Penggunaan media pembelajaran terhadap materi sistem pernafasan manusia kelas xi sma. *Primary Education Journals (Jurnal Ke-SD-An)*, *4*(2), 188–194. https://doi.org/10.36636/primed.v4i2.4469

Weldami, T. P., & Yogica, R. (2023). Model addie branch dalam pengembangan e-learning biologi. *Journal on Education*, *6*(1), 7543–7551. Retrieved from https://jonedu.org/index.php/joe/article/view/4063/3332

Wibowo, T., Johansyah, R., & Astrina, V. (2022). Efektifitas Aplikasi Canva untuk Meningkatkan Motivasi Belajar Siswa Masa Kini. *J-Simbol*, *2*, 103–107. Retrieved from https://jurnal.fkip.unila.ac.id/index.php/BINDO/article/view/26645

Wulandari, T., & Mudinillah, A. (2022). Efektivitas Penggunaan Aplikasi CANVA sebagai Media Pembelajaran IPA MI/SD. *Jurnal Riset Madrasah Ibtidaiyah (JURMIA)*, *2*(1), 102–118. https://doi.org/10.32665/jurmia.v2i1.245

Yolanda, S., & Meilana, S. F. (2021). Pengaruh aplikasi quizizz terhadap minat belajar ipa siswa kelas v di sekolah dasar. *Jurnal Educatio FKIP UNMA*, *7*(3), 915–921. Retrieved from https://www.ejournal.unma.ac.id/index.php/educatio/article/view/1286/847