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Augmented Reality Integrated E-Booklet as a Solution to the Lack of Understanding the Material "How Our Bodies Move " for Grade VI Students

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Abstract
Learning the topic “How Our Bodies Move” in elementary schools often faces challenges due to the abstract nature of the human movement system and the limited availability of interactive learning media. Preliminary observations at SD Inpres 46 Sorong Regency revealed that sixth-grade students experienced low understanding of skeletal, muscular, and joint systems because learning relied mainly on textbooks and verbal explanations. This study aimed to develop an Augmented Reality (AR) integrated e-booklet as an innovative learning medium to improve students’ understanding of the human movement system. The research employed a Research and Development (R&D) approach using the ADDIE model, which includes analysis, design, development, implementation, and evaluation stages, with limitations at the development stage. Data were collected through expert validation sheets and teacher and student response questionnaires. The results showed that the AR-integrated e-booklet achieved very high feasibility based on expert validation, with scores of 90% from media experts, 92% from material experts, and 88% from language experts. User response tests also indicated very high practicality, with teacher responses reaching 96.7% and student responses 93.2%. These findings demonstrate that the AR-integrated e-booklet provides an interactive, concrete, and engaging learning experience that supports students’ understanding of the human movement system. Although the effectiveness on learning outcomes has not yet been empirically tested, the developed media shows strong potential as an innovative science learning resource, particularly for elementary schools in areas with limited educational facilities.

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Keywords: Augmented Reality, E-booklet, Learning Media Development, Elementary School

1. Introduction

Education in the digital era demands innovation in learning methods that can improve students' understanding of abstract and complex material (Sasmita & Prayudi, 2024). Technological developments information and communication opens great opportunity to overcome these problems through the use of Augmented Reality (AR) technology in learning. Augmented Reality is technology that combines three virtual objects dimensions into the real environment in real-time, so that it can provide a more immersive learning experience. interactive and immersive (Purwaningsih, Henny Johan, 2025). Previous research shows that that the use of AR in learning able to increase learning motivation, make it easier understanding abstract concepts, and increase retention Students' memory (Gde *et al*., 2024). By integrating AR into learning media, students can observe the three-dimensional model. dimensions from human motor system, manipulating virtual objects, and view simulations movement body directly through their digital devices. This provides a more immersive learning experience. concrete and meaningful compared to learning methods conventional (Tamboo *et al*., 2024).

Rapid development of technology and information has brought significant changes in various field life, including education (Shelly Efwinda, Irma Puspita, Puardmi Damayanti, Abdul Hakim, 2023). In this digital era, students are required to have critical, creative, and adaptive thinking skills to change (Al-Kamzari & Alias, 2025). Challenges education in this digital era demands power educators to be able to create engaging and up -to-date learning. This can be done by developing digital skills. Development e-booklet integrated Augmented reality (AR) as a tool learning for 6th grade students of Inpres 46 Elementary School, Sorong Regency regarding material theme how the body We moving, which explains about the material of the human skeleton, joints and muscles presents benefits and challenges. Utilization AR technology in education, as shown in Various studies (Desi *et al*., 2023) [10, 11]; (Kusonyang *et al*., 2023) [23], offering engaging and interactive learning experiences, increase students' understanding and interest in the subject matter. Combining real-world events with digital elements, AR can help in acquisition knowledge and increase value pedagogical, however challenges may arise in the development process, such as ensuring the feasibility and suitability of AR applications for educational purposes, as highlighted in research (Hidayat *et al*., 2022) [18] findings. Overcoming these challenges through a thorough analysis, design, development, implementation, and evaluation process, as shown in study, can lead to the creation of effective AR - based instructional media for teaching human skeleton, joints and muscles to 6th grade students.

One of the materials that is often a challenge for elementary school students is "How Our Bodies Move " which discusses... about human motor system, including skeleton, muscles, and joints. This material requires concrete visualization so that students can understand the structure and function of body organs that cannot be observed directly. Initial observations at SD INPRES 46 Sorong Regency, especially for grade VI students, showed that level Students' understanding of this material is still low. This is caused by several factors, including limited available learning media and teaching methods that are still... conventional and textbook- dependent, as well as lack of visualizations that can help students imagine concepts anatomy the human body in general more real.

The limited learning media at SD INPRES 46, Sorong Regency, is the main problem that hinders the process of knowledge transfer. Learning that only... depend on verbal explanations and static images in printed books are not capable provide an in-depth learning experience for students. Students have difficulty visualize how the framework arranged in body, how the muscles Work move bones, and how joints allow for movement. movement. As a result, the material being studied tends to only memorized without understanding comprehensive, so that This has an impact on low student learning outcomes. This condition is exacerbated by the school's location in an area with limited access. to facility modern learning, so that teachers and students have limitations in explore more learning methods innovative.

Research has show that AR application in education, as developed to study human anatomy and surgical procedures (Younis & Al-Hemiary, 2022), 7 Wonders of the World for study social (Ipmawan Kharisma *et al*., 2023) [20], and classification animals for elementary school children, has proven effective in increasing student engagement, retention knowledge and mastery concept, in addition, research has shown that AR-based teaching materials contribute positively to learning eye complex subjects such as anatomy innards through thought algorithmic (Güntepe & Usta, 2021) [16]. Utilise AR technology in e-booklet, students can interactive explore and visualize structure anatomy, leading to a more immersive learning experience. fun and effective, which ultimately improves understanding and retention of learning materials.

Studies have show that technology AR increases attention, confidence, and levels of student satisfaction, which leads to increased learning (Carolina Y Dela, 2023) [8]; (Roumba & Nicolaidou, 2022) motivation. Research that focuses on education science has highlight benefit AR in improving learning outcomes and student motivation, emphasizing the effects positive on skills visuospatial and student (António & Guilhermina Lobato, 2023) [6] engagement. Specifically, at the educational stage medium, AR has found to increase motivation, attention, relevance, confidence, and satisfaction, which ultimately improves performance. academics in students (Amores-Valencia *et al*., 2022) [5].

Based on the problems that have been described, this study aims to develop an integrated Augmented Reality E-Booklet as an innovative solution to improve the understanding of sixth grade students of SD INPRES 46 Sorong Regency regarding the material "How Our Bodies Move ". The developed E-Booklet will contains structured learning content in a way systematic, equipped with AR markers that can display object three dimensions when scanned using AR applications via smartphone or tablet. This learning media is expected to bridge the gap gap between limited resources with the need for effective and interesting learning. In addition, this research will also test the effectiveness of the AR E-Booklet in improving students' understanding, so that it can provide contribution to the development of technology-based learning media in areas with limited access. Thus, this research not only focused on development product, but also on effort equality quality education through utilization technology that is easily accessible and implemented in various context learning.

2. Method

Time and Place of Research

This research was conducted at SD Inpres 46 Sorong Regency, located in Malaus Village. District Salawati Sorong Regency, Southwest Papua Province. Integrated e-booklet trial phase. The augmented reality development will be carried out in September 2025.

Type of Research

The type of research used is research and development (R & D). is a process that USED TO DEVELOP AND validate educational products. The media developed in the form of an e-booklet integrated with augmented reality, where this is to see the practicality of this media in the teaching and learning process in class VI on the theme of the material on how the body works We moving, with sub material of human skeleton, joints and muscles in sd presidential instruction for 46 districts Sorong. This research on the development of an integrated augmented reality e-booklet uses the Addie model (Brench 2009), which is abbreviation from analysis, design, development, implementation, evaluation. This model was chosen because the Addie model is often used Because Addie model stages describe approach systematic for development instructional. As for the development procedures Products

with the Addie model can be seen in Figure 1.

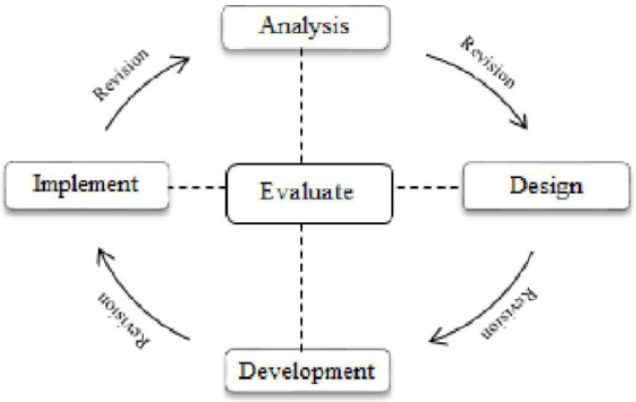

Fig 1: Addie Model (Brench 2009)

Research Instruments

The research instruments are presented in Table 1.

Table 1: Research Instruments

Component	Full Description
Analyze Stage	1. Content Needs Analysis: Identifying material according to the syllabus Curriculum and Teaching, analyzing material characteristics based on the applicable syllabus. 2. Software Needs Analysis: Analyze functional and non-functional requirements system as well as Moodle's capabilities as a tool software for developing learning media.
Design Stage (Design)	Designing e-booklet structure integrated with Augmented Reality, designing the interface, and compiling the development design so that the e-booklet is effective, interactive and attractive used by students.
Development Stage	Developing instructional materials according to the syllabus ; compiling materials, assignments, practice questions ; developing Moodle; developing AR e-booklets and features supporters ; produce the final product is an AR e-booklet structured according to competency along with the validity questionnaire and student response questionnaire.
Implementation Stage	Distribute e-booklets (physical print or digital via Google Classroom/other platforms); train teachers to use e-booklets and AR features ; train teachers to integrate media into learning ; implement learning using e-booklets; observing student responses; collecting effectiveness data through questionnaires.
Evaluation Stage	Using formative evaluation at each stage of ADDIE for rapid improvement. Evaluation includes expert review, individual evaluation, small group evaluation, and field testing. Aims collect practical data to make AR e-booklets more effective and efficient.
Population	All students of SD Inpres 46 Sorong Regency who are studying sub-material skeleton, muscles, and joints.
Sample	Students of class VI of SD Inpres 46 Sorong Regency who have determined to be research participants.
Research Subjects	Class VI students of SD Inpres 46 Sorong Regency.
Research Informants	1 material expert (Lecturer at Muhammadiyah Sorong University of Education), 1 media expert (Lecturer at Muhammadiyah Sorong University of Education), 1 expert language (Lecturer at Muhammadiyah University of Education, Sorong).
Subject Matter Expert Criteria	(1) Truth & accuracy of the material and data up-to-dateness ; (2) The source material is accurate in theoretical & empirical ; (3) Encourage student independence & innovation ; (4) Able to develop and innovate oneself.
Media Expert Criteria	(1) Layout harmonious & have unity ; (2) Placement element clarify function ; (3) Type & size letters according to age development ; (4) Illustration clarify the message.
Linguist Criteria	(1) Spelling, words, sentences are clear & age appropriate ; (2) Illustrations age- appropriate text /images/3D ; (3) Communicative, informative, polite, educational, aesthetic language ; (4) Title & subtitle harmonious, attractive, not provocative.

Research Data Analysis Techniques

Feasibility test (Expert Test)

The resulting data from eligibility feasibility by material experts, media experts and experts Language towards the learning resources developed in the form of qualitative and quantitative data. The quantitative data obtained from the assessment of material experts, media experts and experts Language will analyzed using standard score assessment from (Purwanto, 2013) which has modified.

Expert assessment criteria using a Likert scale with 5 intervals.

Table 2: Validator Assessment Score Criteria

Criteria	Value/Score
Absolutely not agree	1
Don't agree	2
I disagree	3
Agree	4
Strongly agree	5

Source: (Purwanto, 2013)

Teacher and Student Response Questionnaire

Data on student responses to Integrated *e-booklet The augmented reality* developed consists of qualitative and quantitative data. Qualitative data in the form of criticism and suggestions given by students who will used as input in improving the learning resources being developed. Meanwhile, the quantitative data obtained from the assessment of the results of the student's response will analyzed using standard score assessment from Riduwan (2013) who has modified.

Table 3: Student Response Questionnaire Assessment Score Criteria

Criteria	Value/Score
Absolutely not agree	1
Don't agree	2
I disagree	3
Agree	4
Strongly agree	5

Source: (Riduwan, 2013)

Percentage eligibility *E-booklet* obtained based on the calculation of the scores given on the sheet feasibility, teacher response questionnaire and student response questionnaire using the formula from Purwanto (2013). The following is a description of the formula used:

$$NP = \frac{R}{SM} \times 100$$

Information:

NP = Percentage eligibility
R = Score obtained
SM = Maximum score

After being obtained mark percentage eligibility, results obtained mark will be interpreted based on table 3.3 Eligibility Level Criteria *E-booklet. EBooklet* it is said worthy if the minimum eligibility average is in the category feasible (76% - 85%). If the results are suitable for use so Integrated *e-booklet Augmented reality* ready to be tested try it, but if it's not worth it so will be revised again.

3. Results and Discussion

Research and development that has been done produce product in the form of integrated e-booklet Augmented reality. Research and development results obtained based on procedure research used.

Results of the analysis stage (analysis)

Results based on interviews show that SD Inpres 46 districts push has use curriculum independent. Learning resources used by teachers and students during learning ipas Still in the form of textbooks, modules and slides. In the material on the human movement system in class VI, learning is also carried out outside the classroom, but Still in the form of direct direction from the teacher who teaches. Use of learning resources and media used Still very limited, so that the evaluation results from the interviews that have been conducted are necessary development of learning resources at the school, which are interesting and can be accessed anywhere.

Stage results designing (design)

Device developed learning in the form of integrated e-booklet augmented reality which has 15 pages that can be health services using the link provided designed use canva For designing content graphics and materials used. Design stage on Canva can seen in figure 4.2. All ebooklet design is designed use help canva, with all over assets used with pro access. So that researchers freely For selecting and designing illustration interesting picture

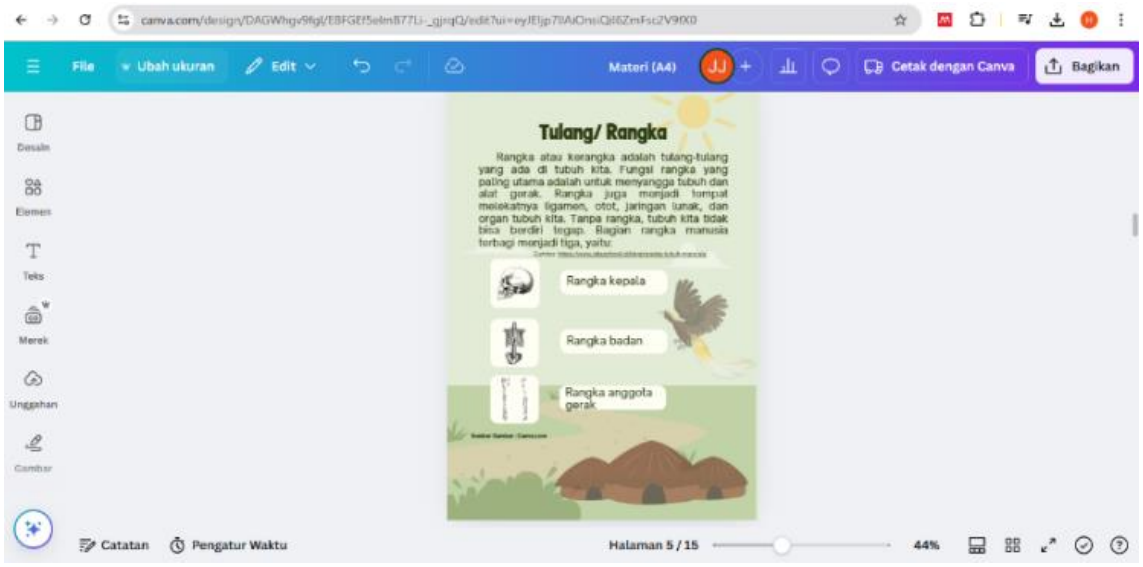

Fig 1: E-booklet design USING Canva.

Experience like read book conventional, namely with open each the sheet as it should be paper in a book, researcher design it using the link heyzine.com, which can seen in Figure 2.

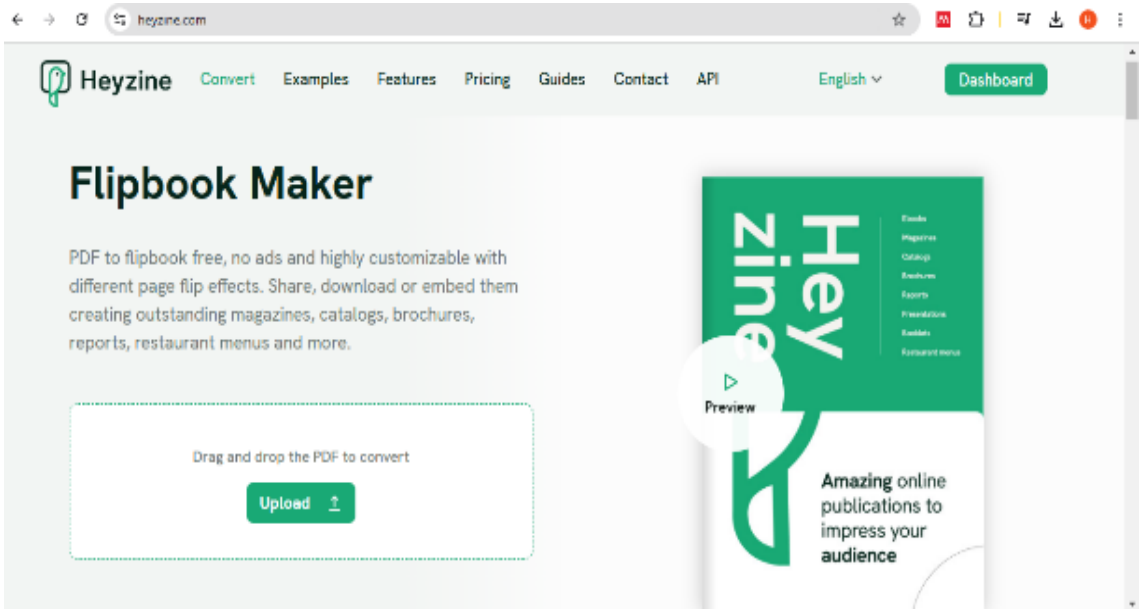

Fig 2: design using heyzen.com

Design augmented reality itself, researchers use application blender for 3d assets, then vuforia as database and unity For determine target and location image, and output application This stage Can seen in Figure 3.

Fig 3: *augmented reality design*

Framework integrated *e-booklet augmented reality* developed which includes material main system human movement in class VI of elementary school / MI. The design of the front cover is arranged load title, image animation, class, phase, eye lesson, year, column Name writer, and focus material that is system movement in humans. *Cover* integrated *e-booklet augmented reality* own combination between color green - greenery and color white, so that make appearance from integrated *e-booklet augmented reality* become more interesting. Evaluation has done with request opinion a number of Friend colleagues, with send design results, and found results a number of input, including simplification suitable material For child school basis and composition page.

Stage results development

Stages development integrated *e-booklet augmented reality* explain regarding the media that has been arranged author based on design.. Integrated *e-booklet augmented reality* human motion system material is feasible based on components content, presentation and language will assessed eligible by the validator. The validator will evaluate eligibility integrated *e-booklet augmented reality* through a feasibility questionnaire sheet. In the feasibility test research integrated *e-booklet Augmented reality* is carried out by media experts, material experts and experts language. The results of the feasibility test from the three validators in Table 5.

Table 5: Feasibility results *e-booklet* integrated *augmented reality* material on human movement systems for grade VI elementary school presidential instruction for 46 districts push

No.	Validator	Evaluation Aspect	Score Acquisition	Maximum Score	Percentage (%)	Criteria
1	Media expert	Eligibility graphics	72	80	90	Very worthy
2	Subject matter expert	Material suitability	69	75	92	Very worthy
3	Linguist	Eligibility presentation	44	50	88	Very worthy

Feasibility test has been carried out by expert validators get results and There are several parts that need to be revised or improved. This is done so that the e-booklet is integrated. augmented reality The research developed by the researcher yielded good results. The revision or improvement stage was carried out based on input and suggestions from the validator regarding integrated e-booklet augmented reality human motion system material input and suggestions provided by validators for improvements to the integrated e-booklet the augmented reality that was developed can be seen in Table 5.

Table 5. Suggestions from expert validators on material, media and language

No	Type of repair	Comments / suggestions	Improvement results
1	Grammar corrections to sentences on the front cover page		
2	Image caption fix		
3	Addition Sentence Opener		
4	Adding Source Citations to Images		

After revisions or improvements are made based on input and suggestions from expert validators, a response test is then carried out to find out. response users namely teachers and students towards integrated e-booklet augmented reality developed. User response testing use A response questionnaire sheet with 3 assessment aspects. The response test was conducted on teachers and 20 sixth grade elementary school students. presidential instruction regency push.

No	Aspect	Evaluation		Evaluation	Criteria
		Score acquisition	Maximum score		
1	Material	30	30	100	Very practical
2	Presentation	39	40	97.5	Very practical
3	Language and images	18	20	90	Very practical
Percentage value 87 90				96.7	Very practical

Table 7. Results of student response tests on *e-booklet* integrated *augmented reality* human movement system material presidential instruction for 46 districts push

No	Evaluation			Percentage	Criteria
	Number of students	Score acquisition	Maximum score		
1	20	1239	1330	93.2	Very practical

Table 7 presents results evaluation to response participant educate to e-booklet material system movement humans who have equipped with feature augmented reality (ar). E-booklet This used in elementary school presidential instruction for 46 districts push and involve as many as 20 participants students. The total number of scores obtained from all over participant educate is 1239. This score obtained from evaluation to various aspect e-booklets, such as convenience use, interesting material using ar. The maximum score that can be achieved is 1330. This shows total score maximum that can be obtained If all participant educate give evaluation highest of all aspect. Percentage scores obtained is 93.2%. This means that, in general, overall, participants educate give very good assessment positive to e-booklet. Based on percentage score said e -booklet categorized as " very practical ". Shows that participant educate feel e-booklet very useful and easy used in the learning process. This study uses the ADDIE model with limitations in the development stage. These limitations are caused by two things. factor main. First, the time constraints that the researcher has. Second, the complexity in making 3D learning media using device computer. Considering these two constraints, this research is more focus on development valid 3D learning media products that are ready to be implemented. Evaluation of effectiveness of learning media will be a further research agenda

Research on the Development of an Integrated Augmented Reality E-Booklet on Human Movement System Material for Grade VI Elementary Schools in Presidential Instruction 46, Sorong Regency Has Produced Product Appropriate and Practical Learning Used. Validation Results from Media Experts Show Percentage Eligibility 90%, Material Experts 92%, and Language Experts 88%, All Three It is in the "Very Eligible" Category. This achievement is in line with the research of Safitri *et al.* (2021) who developed AR -based learning media on the material of the system. Human Digestion and Obtaining Validation Results from Media Experts of 89% and Material Experts of 91%, Showing That Development of AR -Based Learning Media Consistent Produce Products with a High Level of Feasibility. This high Feasibility Value Indicates That the Developed E-Booklet Has Met Standards from Aspect Graphics, Materials, and Language Required in Learning Media At Elementary School Level.

The Application of Addie's Development Model in This Research is Proven Effective for Designing and Developing Systematic and Structured Learning Media. The Analysis Stage Successfully Identifies Fundamental Problems That is Limitations of Learning Media In Inpres 46 Elementary Schools, which still rely on conventional textbooks and modules, this finding is reinforced by research (Silaban, 2024), which states that That Learning Science in elementary schools is still dominated by lectures and print media, which are less effective at visualizing abstract concepts such as the human motor system. The design phase of this study utilized Canva. E-Booklet Display and Blender to Develop 3D Assets, While Vuforia and Unity Are Used as AR Development Platforms. The Selection of These Digital Tools Is Aligned with Research (PA Sari *et al.*, 2024) Which Uses Combination of Similar Software in Developing AR Media for Biology Learning and Successfully Creating Visualization Three Interactive and Interesting Dimensions for Students.

User Response Test Results Demonstrates a Very High Level of Practicality, with Teachers Giving a Rating of 96.7% and Students Giving a Rating of 93.2%, Both in the "Very Practical " Category. This High Level of Positive Response Indicates That the E-Booklet Ar is Able to Provide a More Effective Learning Experience Interesting and easier to understand compared to conventional media. Research (Mubin *et al.*, 2024) Support This finding by mentioning That the Use of AR in Learning Can Increase Students' Learning Motivation by Up to 87% Because It Provides More Visualization Concrete To Objects Learned. Likewise Research (Anjely *et al.*, 2025) Show That Implementation Ar In Learning Science in Elementary Schools Can Increase Student Interest in Learning by 85% Because It Creates Interactive and Enjoyable Learning Experiences. Interactivity Offered by Technology AR Enables Learners To Manipulate Virtual Object Three Dimensions, such as viewing the structure of the skeleton, muscles, and joints from various Point of View, So Make it easier Understanding Regarding Abstract Material.

The Combination of Digital E-Booklets and Technology In this research, Ar creates hybrid learning media that combines

The Advantages of Print Media with Innovation Digital Technology. E-Booklets Developed Through the Heyzine.com Platform Provide a Reading Experience Like a conventional book with a flip page feature, but Enriched With Capabilities Bringing up 3d Objects Through Scannable AR Markers Using a Smartphone or Tablet. This approach aligns with the blended learning concept proposed by (Nurhayati, Maghfiroh, Aprodhita, Zahra, & Hidayat, 2025), which states: That The combination of print and digital media can accommodate Various Learning Styles of Students. Research (Fauziah *et al*., 2025) Also Shows That the Use of Interactive E-Booklets in Learning Can Improve Understanding Student Concept of 78% Due to Presentation Information In a way Systematic with attractive visualizations. In context Learning Human Movement System, 3D Visualization Allows Students to Observe Anatomical Details Bodies That Cannot Be Seen Through Two- Dimensional Drawings In Ordinary Textbooks.

However, this study has Limitations in the Implementation and Evaluation Stages that Have Not Been Carried Out Thoroughly Comprehensive. Research is limited to the development stage in Addie's model due to time constraints and complexity. 3D Media Creation. This Indicates That Effectiveness of E-Booklet Ar To Improvement in Student Learning Outcomes Cannot Yet Be Measured Empirically In This Research. Research (WP Sari *et al*., 2025) Remind That The feasibility and practicality of learning media is not guaranteed Its effectiveness in improving students' understanding and learning outcomes, so that Further research is needed to measure The Real Impact of Using E-Booklets Ar To Achievements Learning. Experimental research with a pretest-posttest control group design can be conducted at a later stage to compare Effectiveness of AR E-Booklet with Learning Media Conventional Methods in Improving Students' Understanding of Human Movement System Material.

Context Implementation of This Learning Media at Sd Inpres 46 Sorong Regency, Which is an Area with Limited Access Modern Learning Facilities Provide Added Value. Development of E - Booklets Show That Technology Learning Innovation Can Be Implemented Even in Areas With Limitations Infrastructure, Throughout Available Smartphones and Tablets Are Now Widely Owned by the Public. Research (Fajar Laelatul Fitri, Sutiah, 2025) State That Smartphone Penetration in Indonesia Has Reached 68% Even in Rural Areas, So The development of mobile application-based learning media is a realistic solution to overcome The Gap in Access to Education. However Thus, Challenges Such as Limitations Internet Networks and Digital Skills of Teachers and Students Remain Considerable in the Implementation of Technology- Based Learning Media. (Nurhayati, Maghfiroh, Aprodhita, Zahra, Hidayat, *et al*., 2025) Show That Training for Teachers in the Use of Digital Learning Media is a Key Factor Success Implementation Educational Technology in Remote Areas.

From the Perspective of Learning Theory, the AR E-Booklet was Developed in Line with Constructivism Theory Which Emphasizes the Importance of Direct Experience and Active Interaction of Learners with Objects Learning. Vygotsky (1978) stated That Effective Learning Occurs When Students Can Manipulate and Interact with Objects Learning Within Their Zone of Proximal Development. Technology Ar Providing Digital Scaffolding That Enables Learners to Explore Complex Concepts in General Independent With the Help of Visualization Three Dimensions. Research (Amalina *et al*., 2024) in their meta-analysis of 68 studies on Ar In Education Shows That AR Can Improve Understanding Concept, Learning Motivation, and Collaboration Between Students Because It Creates an Immersive and Interactive Learning Experience. In the Context Learning Human Movement System, Students' Ability to See and Rotate 3d Objects of Skeleton, Muscles, and Joints From Various Point of View Giving Understanding Better Spatial Compared to Static Images in Textbooks.

Aspect The language and presentation of material in the Ar e-booklet also received Special Attention in This Research. Based on the Validator's Suggestions, Improvements were Made to the Grammar, Additions Sentence Communicative Opening, Improved Image Captions, and Added Reference Sources. These Improvements Are Important to Ensure That the material presented is in accordance with the level of cognitive development and language abilities of grade VI elementary school students. Research (Indah Resti Ayuni Suri, Bambang Sri Anggoro, 2024) emphasizes that the use of communicative, informative, and appropriate language to the characteristics of students is one of the principles Developing Effective Learning Media. In addition, including reference sources for each image and information not only fulfills the requirements Scientific Writing Rules But Also Teaches Students About The Importance of Information Literacy and Appreciating the Work of Others from an Early Age.

Integration of E-Booklets with the Implemented Independent Curriculum At Sd Inpres 46 Sorong Regency Shows The Relevance of This Learning Media to the Current National Education Policy. The Independent Curriculum Emphasizes Student-Centered, Flexible, and Utilizing Learning Technology to Improve Quality Learning. Research (Mutmainnah, Nur Fadilah, 2025) State That Implementation Independent Curriculum Requires Innovative and Facilitative Learning Media Support Learning Differentiation According to the Needs and Characteristics of Students. AR E-Booklets Enable Students to Learn in a Independently at their own pace, reviewing material that is not yet understood, and exploring Concepts in a way that suits their learning style. This is in line with the principle Learning Differentiation is one of the main characteristics of the Independent Curriculum (Anis Eko Liyawindari, Wahyu Sukartiningsih, 2023).

Sustainability of the Use of AR E-Booklets Also Needs to be Considered in Implementation Long- term. Digital Learning Media Requires Maintenance, Content Updates, and Adaptation On Technological Development. Research (Shelly Efwinda, Irma Puspita, Puardmi Damayanti, Abdul Hakim, 2023) Remind That One of the Challenges of Using Technology -Based Learning Media is the Need for Updates Periodic and Ongoing Technical Support. Therefore, there needs to be a commitment from schools and local governments to provide Infrastructure Supporters, Training Sustainable for Teachers, and Mechanisms Content Updates to Keep the AR E-Booklet Relevant and Effective Long - Term Use : This Research Provides a Solid Foundation for the Development of Learning Media Similar to Science Materials Others Who Need Visualization Three Dimensions, Like Systems Circulatory System Digestion, Or System Human Respiration.

5. Conclusion

Based on the results of research and development that has been carried out, it can be concluded that the e-booklet integrated with augmented reality (AR) on the human movement system material for class VI of SD Inpres 46 Sorong Regency was successfully developed as a very effective learning medium worthy and very practical used. Media development with the ADDIE model is capable of address the problem of limited learning resources and low students' understanding of the abstract material "How Our Bodies Move ". Validation results show level very good eligibility tall from media experts (90%), material experts (92%), and experts language (88%), while the results of user response tests also show excellent practicality, both from teachers (96.7%) and students (93.2%). Integration of visualization object three dimensions through AR technology in e-booklets provide a more immersive learning experience. concrete, interactive, and interesting, so help students understand draft skeleton, muscles, and joints in a way more in-depth. Although this research is still limited to the development stage and not yet test effectiveness to empirically improving learning outcomes, these findings indicate that AR e-booklets have great potential to be implemented as an innovative science learning media in elementary schools, especially in areas with limited resources. facilities, as well as worthy of further development at the implementation and evaluation stages of learning.cknowledgements

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