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DEVELOPMENT OF AR-COMIC DIGITAL BOOK BASED ON PANCASILA STUDENT PROFILE TO ENHANCE LEARNING INDEPENDENCE

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Abstract. The development of digital technology has given rise to the need for innovative learning media that foster character and independent learning in students. The findings reveal that student autonomy in learning remains limited in elementary schools, primarily due to the limited availability of interactive media that incorporates character values. The present study was conducted to address this need by developing an Augmented Reality-Comic Digital Book based on the Pancasila Student Profile. This digital book has been designed to improve student learning independence. The methodology employed was that of Research and Development (R&D), utilising the ADDIE development model, which encompasses the stages of analysis, design, development, implementation, and evaluation. Subject matter experts and media experts conducted the validation process, while the effectiveness testing utilised questionnaires and independent sample t-tests on a sample of 51 fifth-grade elementary school students. The validation results demonstrated that the media was in the highly feasible category, with a score of 93.75% for the material aspect and 91.67% for the media aspect. The efficacy test demonstrated a substantial enhancement in student learning autonomy following the utilisation of media resources. The integration of augmented reality technology, digital comics, and the Pancasila Student Profile was the primary innovation in this study. These findings suggest that AR-Comic Digital Books have the potential to function as an innovative medium for enhancing students' independent character, thereby improving the quality of learning in accordance with the principles of the Merdeka Curriculum.

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INTRODUCTION

The advent of digital technology has had a profound impact on the field of education. Information technology has emerged as a significant catalyst for the dissemination of shared knowledge, thereby becoming a major force in education reform (Haleem et al., 2022). The contemporary learning process no longer relies exclusively on printed books; instead, it employs a combination of interactive and innovative digital media. One of the key competencies that should be developed from an early age, especially during elementary school years, is the ability to learn independently. It is essential to recognize the importance of fostering this skill, as it plays a crucial role in preparing students to compete at higher levels (Fitriani et al., 2020). Conditions in the field show that many elementary school students still have difficulty learning independently, tend to be passive, wait for instructions, lack initiative, and have not been able to utilize technology to support the learning process optimally.

This challenge has become increasingly evident alongside the implementation of the Merdeka Curriculum, which places significant emphasis on meaningful learning and reinforcing the five principles of the Student Profile. The independent curriculum is predicated on the principle of learning with a more flexible approach, which allows teachers to use a variety of appropriate learning methods and materials (Kamila & RM, 2023). Citrawati (2024) underscored the efficacy of the Merdeka Curriculum approach in fostering learning independence among elementary school students, particularly within the framework of inclusive education. The development of learning media in accordance with the policy directives outlined in the Merdeka

Curriculum is paramount, as it enables students to engage in active and independent learning.

The potential to create innovative solutions that foster independent learning can be achieved through the use of augmented reality (AR) and digital comics. Augmented reality (AR) is a technology that merges real-world environments with virtual components in real time, providing learners with an interactive and engaging learning experience (Khan et al., 2019). The integration of enjoyable, easily accessible digital comics has been shown to stimulate children's imagination (Astuti et al., 2022; Khotimah & Hidayat, 2022). A multitude of studies have previously demonstrated the efficacy of digital comics in a variety of learning contexts. Safitri & Nurharini (2024) demonstrated that the implementation of differentiated learning strategies, facilitated by digital comic strips, results in substantial enhancements in student learning outcomes. Candrayani & Sujana (2023) developed digital comics based on character values in Ramayana stories. These comics were found to be valid and feasible for use in elementary schools. Fitria et al. (2023) corroborated the hypothesis that digital comics can enhance student motivation and conceptual understanding while fortifying science literacy. Lestari et al. (2021) demonstrated that CTL-based math comics can enhance critical thinking skills while instilling character values.

The incorporation of AR into digital comics has been shown to enhance the effectiveness of learning media. Studies demonstrate that AR-based comics effectively boost elementary students' reading interest (Astuti et al., 2022), while Ivana et al. (2023) found that AR-integrated illustrated comics can improve mathematical problem-solving skills among junior high school students. Previous studies have shown that Augmented Reality-based learning media developed in alignment with the Pancasila Student Profile can enhance the learning interest of fourth-grade elementary school students (Pratiwi et al., 2024). These findings collectively affirm that the integration of AR technology in educational media is not only engaging but also holds substantial potential for improving the quality of learning across different educational levels.

Another study demonstrated that AR-based learning media and digital comics positively influence the quality of learning among elementary school students. Wu et al. (2024) revealed that the use of AR-based mathematical picture books can enhance geometric thinking abilities, lower cognitive load, and improve students' flow experience throughout the learning process. Komang et al. (2024) proved that AR-based learning comics with a metacognitive approach have a high level of validity and practicality, and are effective in increasing cultural literacy and reading engagement. The relationship between digital comics and character strengthening in the Merdeka Curriculum is strengthened by Sari & Putri (2025), which shows that Pixton-based digital comics effectively improve the character of the Pancasila Student Profile, as well as the learning outcomes of elementary school students. Naisa'ada & Mulyani (2025) also developed a digital comic, "Nafi Lala", which integrates the dimensions of the Pancasila Student Profile and is proven to be feasible and effective in improving understanding of narrative text. The research confirms that digital comics not only strengthen cognitive aspects, but are also relevant as a medium for strengthening character, in line with the spirit of the Merdeka Curriculum.

Most previous studies have focused on improving cognitive abilities, learning motivation and student literacy. The aspect of learning independence as part of the character building of the Pancasila Student Profile has not been studied in depth. The integrated use of AR technology and digital comics in one learning media is still limited, especially in the context of elementary school. Previous media development was generally carried out separately, between AR and digital comics, without the integration of the Pancasila Student Profile values in the storyline and comic content as the basis for the formation of learning independence. This is in line with the Merdeka Curriculum, which places the Pancasil Learner Profile as the main foundation of learning (Astuti et al., 2024).

This research is positioned as a further development that integrates AR technology and digital comics in the context of character building of the Pancasila Student Profile. The product, developed in the form of Augmented Reality-Comic Digital Book, is designed to present an interactive learning experience while fostering the learning independence of elementary school students. The novelty of this study lies in the integration of digital comics, AR technology, and the values embedded in the Pancasila Student Profile. The developed product is designed to

encourage students not only to read but also to actively interact with the content, explore information, and make independent learning decisions. This research offers a contribution in the form of innovative, engaging, and contextually relevant learning media that align with the competencies required of 21st-century learners.

RESEARCH METHODS

This research employs the Research and Development (R&D) method, which emphasizes the creation of specific products and the evaluation of their effectiveness. R&D serves as a systematic approach that follows a sequence of structured steps to design new products or improve existing ones (Okpatrioka, 2023). The development process of the Augmented Reality-Comic Digital Book in this study adopts the ADDIE model, which consists of five stages: (1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation. The overall process is illustrated in Figure 1.

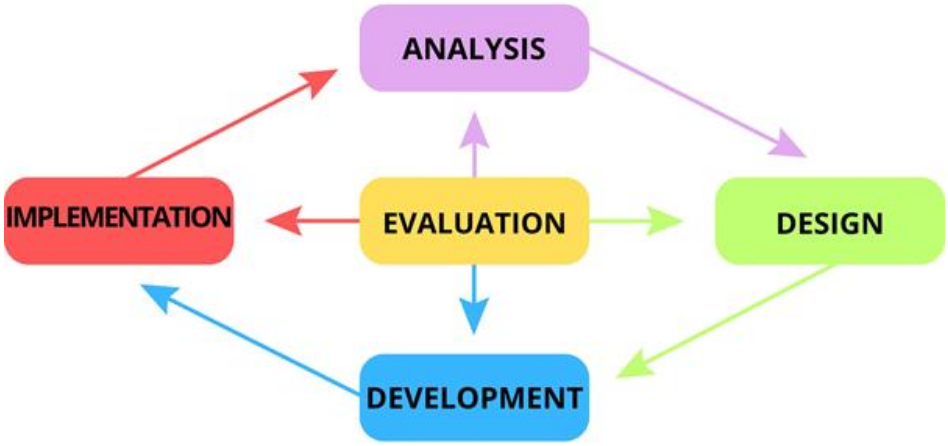

Figure 1. ADDIE Stages

The product feasibility test is conducted to determine the extent to which the Augmented Reality-Comic Digital Book developed meets the standards as a learning medium. The validation process was executed by two parties, designated as the Content Expert and the Media Expert, employing a Likert scale questionnaire instrument. The data from the validation results were then subjected to analysis using the calculation of the percentage of feasibility with the formula:

$$\text{Precentage} = \frac{\text{Overall Average Score}}{\text{Maximum Ideality Score}} \times 100\%$$

The criteria for interpreting the percentage of feasibility are determined as in Table 1.

Table 1. Interpretation Criteria for AR-Comic Digital Book Feasibility Test Results

No	Precentage (%)	Criteria
1	81-100	Very Feasible
2	61-80	Feasible
3	41-60	Moderately Feasible
4	21-40	Less Feasible
5	0-20	Not Feasible

The participants in this research were fifth-grade elementary school students divided into two groups, totaling 51 learners. Class V-A comprised 27 students (52.94%), including 13 boys and 14 girls, while Class V-B consisted of 24 students (47.06%), with 11 boys and 13 girls. Overall, the sample included 24 male students (47.06%) and 27 female students (52.94%), indicating a balanced gender distribution. Data for this study were collected from experts, teachers, and students using both quantitative and qualitative methods. Quantitative data refer to information expressed in numerical values (Sofwatillah et al., 2024). The data collection employed a non-test instrument, specifically a questionnaire, designed to measure students' learning independence. The quantitative data were obtained through questionnaire responses using a four-point rating scale: strongly agree (SS) = 4, agree (S) = 3, disagree (KS) = 2, and strongly disagree (TS) = 1. A detailed description of the learning independence instrument is provided in Table 2.

Table 2. Learning Independence Instrument

Aspect	Indicator	Deskripsi
Have a disciplined & responsible behavior in learning	Planning Indonesian learning activities	Learners are able to arrange study plans regularly according to a set schedule so that learning activities take place systematically and purposefully.
	Being on time for Indonesian assignments at school	Learners show discipline by completing and submitting assignments on time as a form of academic responsibility.
	Awareness of learning	Learners have an intrinsic awareness to learn without having to be constantly reminded, both in Indonesian language subjects and other relevant subjects.
Have self-initiative in learning	Perform Indonesian learning activities of their own accord	Learners show independence by starting learning activities voluntarily, driven by internal motivation without coercion from teachers or others.
	Choosing and determining own Indonesian language learning resources	Learners are able to independently search, select, and utilize various learning resources that are relevant to the needs of Indonesian language learning.
Have confidence in learning	Non-dependence on others in learning Indonesian language	Learners are able to complete tasks and understand subject matter independently without always relying on the help of others.
	Dare to express opinions when learning Indonesian	Learners have the courage to express ideas, ideas, and responses in class discussions as a form of academic self-confidence.
	Believing in our own Indonesian language skills	Learners believe in their potential and skills in understanding and doing Indonesian language assignments so that they do not easily feel inferior.
Exercise self-control in learning Indonesian	Knowing the usefulness of learning Indonesian	Learners understand the benefits of learning Indonesian for developing communication skills, critical thinking, and general academic success.
	Observing Indonesian learning outcomes	Learners are able to review the learning outcomes that have been achieved to determine the extent to which understanding of the material and language skills have developed.
	Evaluating Indonesian learning outcomes	Learners reflectively assess learning achievements, identify weaknesses, and formulate improvement strategies to achieve more optimal results.

Quantitative data is defined as data that is expressed in numerical form or that represents a quantifiable amount (Sofwatillah et al., 2024). The quantitative data presented in this study were derived from a survey administered to students to assess their learning independence. Questionnaires were also used to obtain data from experts and practitioners to assess the validity and practicality of the media. The data concerning learning independence was collected through the administration of questionnaires to students. The effectiveness test was executed through the analysis of questionnaire data concerning learning independence, initiated by a homogeneity test employing the F-test. In addition, hypothesis testing was executed by means of the t-test technique (independent sample t-test).

RESULTS AND DISCUSSION

The analysis stage entailed a comprehensive review of extant literature and field studies. The present study was conducted to collect information about augmented reality (AR)-based learning media, educational comics, and the integration of the Pancasila Student Profile, especially the dimensions of independence, creativity, and critical reasoning. The results of the literature study demonstrated that interactive digital media has the potential to enhance learning motivation and student engagement. However, its application in developing students' character as a whole

remains limited. Field studies were conducted through the administration of questionnaires and interviews with teachers and students. Questionnaires were administered to ascertain students' needs and difficulties in learning independently, while interviews with teachers were conducted to identify learning constraints and expectations for media that support student independence. The results of the interview indicate that students frequently rely on teacher direction, exhibit a lack of initiative, and rarely seek out supplementary learning resources. It was asserted by members of the teaching profession that the integration of contextualized interactive media would facilitate student autonomy in their learning and promote a deeper connection with the surrounding environment.

During the design stage, researchers reviewed the learning outcomes and objectives in Indonesian language materials in the Merdeka Curriculum. The learning outcomes encompass a variety of linguistic competencies, including the understanding of capital letters, command sentences, and the writing of numbers and numbers. Additionally, the outcomes include skills in speed reading, also referred to as scanning, and the composition of simple announcements. The objective of designing this augmented reality-based comic book is to provide a more engaging and interactive learning experience, thereby enabling students to not only acquire knowledge of the Indonesian language and history in a theoretical capacity, but also develop practical skills that they can apply in their daily lives.

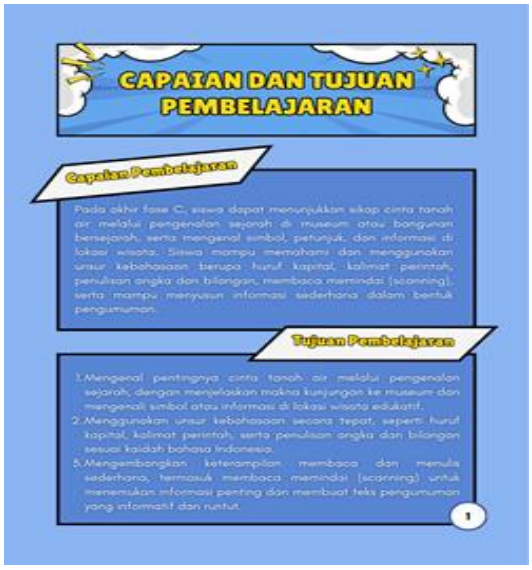

Figure 2. Learning Outcomes and Learning Objectives Analysis

As illustrated in Figure 2, the learning outcomes and learning objectives emphasize the cultivation of attitudes, the enhancement of linguistic competencies, and the expansion of historical awareness. These learning outcomes are designed to foster an attitude of patriotism in students, with the objective of developing an understanding of Indonesian history through museum and historical building visits. The outcomes also include the recognition of symbols and information in educational tourism locations. The learning objectives also include mastery of linguistic elements, such as the use of capital letters, command sentences, and writing numbers and numbers in accordance with Indonesian language rules. The objective of this initiative is to facilitate the comprehension and implementation of linguistic principles in students' daily lives.

During the developmental stage, the comic book was produced with an appealing visual design and was found to be readily comprehensible to elementary school students. Researchers compiled a story script that combines Pancasila values and linguistic material in the context of Indonesian history. The comic book development began with the creation of the main characters using the Pixton application, which allows researchers to design characters that match the characteristics of elementary school students. Pixton was used to create characters that represented the values of Pancasila, the characters were designed with relevant facial expressions and clothing to illustrate their traits. Canva was used to arrange the comic pages such as arranging illustrations, dialog, and AR elements. Each comic chapter is organized in such a way as to make it easier for

students to understand the Indonesian language and history material through the stories conveyed by the characters.

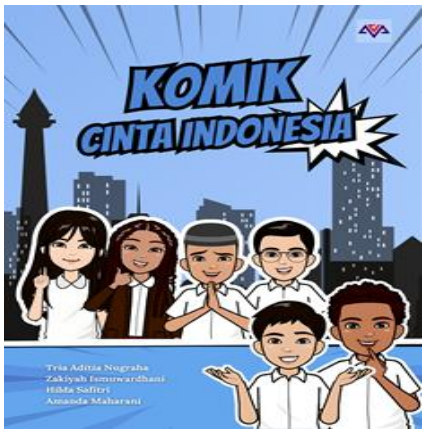

Figure 3. Cover AR-Comic

As illustrated in Figure 3, the comic cover features the primary characters, that represent the dimensions of the Pancasila Student Profile. This cover is dominated by the color blue, which creates a calm but energetic impression, and displays the main characters who play an important role in the story. This cover is designed to introduce the main theme of the comic, which is learning history and the blue color that dominates on this cover, aims to attract students' attention and create curiosity to follow the characters' adventures in exploring Indonesian history. Character conversations can be seen in Figure 4.

Figure 4. Contents Page

As illustrated in Figure 4, the discourse among the characters in the comic, who are engaged in a collaborative effort to comprehend Indonesian history and language, is also distinctly delineated. This particular comic page contains a QR code that students can scan to access supplementary material related to the history of Monas and the National Museum, thereby enriching their learning experience. As illustrated in Figure 3, the application of QR codes facilitates access to supplementary materials pertinent to the subject matter under study. The augmented reality (AR) component of this figure presents a valuable opportunity for students to engage directly with the historical and linguistic content. The comic was also developed as a web-based application using FlipHTML to enhance accessibility and convenience for students in reading the comic. The utilization of FlipHTML facilitates the accessibility of the comic, enabling readers to engage with it at any time and from any location, provided they have access to a device. This web-based application provides students with convenient access to the comic, independent of their physical location, as it can be read from any location with a device.

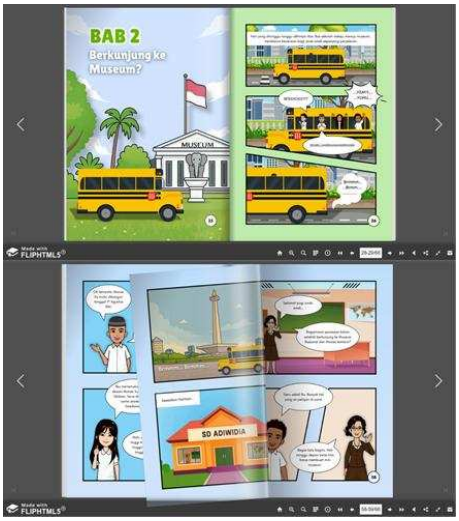

Figure 5. Flip Comic Digital Book

As illustrated in Figure 5, the implementation of a web-based comic application that utilizes FlipHTML is evident. It has been demonstrated that students have the capacity to effortlessly navigate the pages of a comic book and engage directly with the augmented reality (AR) content that is made available to them. This feature facilitates the accessibility of Indonesian history and language materials for students, enabling them to engage with these resources at their own pace and in a flexible manner. The reader is directed to the following link to access the comic: https://bit.ly/komikcintaindonesia. The link facilitates access to the AR-Comic Digital Book, which serves as a learning resource for students pursuing Indonesian language studies. At the Implementation stage, before the comic book is applied directly in classroom learning, this learning media needs to be assessed for feasibility by experts. The assessment is conducted by Content Experts, who evaluate the quality and utility of the material, and by Media Experts, who assess the appearance, functionality, fonts, and usability of learning media.

Table 3. AR-Comic Digital Book Feasibility Assessment Results

Expert	Aspect	Score Obtained	Max Score	Percentage	Decision
Content Expert	Material Quality	38	44	86.36%	Very Feasible
	Usefulness	22	24	91.67%	Very Feasible
	Total/Average	**60**	**64**	**93.75%**	**Very Feasible**
Media Expert	Display	16	20	80%	Very Feasible
	Operation	15	20	75%	Feasible
	Font	24	24	100%	Very Feasible
	Usability	11	14	78.57%	Feasible
	Total/Average	**66**	**72**	**91.67%**	**Very Feasible**

As illustrated in Table 3, the results of the feasibility assessment of the AR-Comic Digital Book were determined by subjecting the material and media to evaluation by experts. The results of the Content Expert and Media Expert assessments indicate that the comic is considered to be highly feasible for use as a learning medium. The assessment results, with a total score of 93.75% from the Content Expert and 91.67% from the Media Expert, demonstrate the considerable feasibility of the AR-Comic Digital Book as an interactive learning media to support student learning independence. This evaluation offers a robust foundation for subsequent implementation in the context of classroom instruction. During the evaluation stage, analysis is conducted through the administration of student response questionnaires, which are utilized to assess aspects of learning independence. Additionally, media effectiveness tests are employed to evaluate the efficacy of the media in facilitating learning. Prior to further analysis, descriptive statistics were analyzed to understand the basic characteristics of the two study groups. This information is crucial to ensure that the data utilized aligns with the fundamental assumptions underlying subsequent analyses. The following descriptive statistical results are presented in Table 4.

Table 4. Descriptive Statistics

	Rombel	N	Mean	Std. Deviation	Std. Error Mean
Learning independence	ClassV-A	27	81.48	9.811	1.888
	Class V-B	24	80.13	12.753	2.603

The results of the descriptive analysis demonstrated significant differences between the two study groups tested, namely Class V-A and Class V-B. A comparative analysis of the two classes revealed that they exhibited comparable levels of learning independence. However, a closer examination revealed that Class V-A had a higher average score and a more homogeneous distribution of scores than Class V-B. The next step is to conduct an independent-samples t-test analysis. The ensuing results of the aforementioned test are presented in Table 5.

Table 5. Result of Independent Sample t-test

		Lavene's Test		t-test for Equality of Means					
						Significance			
		F	Sig	t	df	One-Sided p	Two-Sided p	Mean Difference	Std. Eror
Learning independence	Equal variances assumed	2.462	.123	.428	49	.335	.670	1.356	3.167
	Equal variances not assumed			.422	43.031	.338	.675	1.356	3.216

The findings of the Independent Sample t-test on the learning independence variable indicate that the data of the two groups possess homogeneous variances, as evidenced by the Levene's Test value of $F = 2.462$ with a significance of 0.123 ($p > 0.05$). Therefore, the comparison of the average learning independence between class V-A and class V-B was analyzed using the assumption of equal variance. The t-test value obtained was $t = 0.428$ with degrees of freedom (df) = 49 and two-tailed significance ($p = 0.670$), which is greater than 0.05. This finding suggests that there is no statistically significant difference between the average learning independence of students in class V-A ($M = 81.48$) and class V-B ($M = 80.13$). The mean difference of 1.356 shown in the analysis results is insignificant, as the 95% confidence interval (-5.007 to 7.720) includes the value of zero.

The degree of student learning independence exhibited in both classes is comparable; however, a slight elevation in descriptors is observed in class V-A relative to class V-B. The findings of the study indicate that there is no statistically significant discrepancy in the level of learning independence between class V-A and class V-B. This finding suggests that the two groups of students possess comparable abilities, thereby ensuring that the learning approach employed is capable of maintaining uniformity in the attainment of learning independence achievements across both classes.

The findings of this research show that implementing comics integrated with augmented reality (AR) has great potential to enhance elementary students' learning autonomy, particularly in Indonesian language and history subjects. This supports the perspective that learners are capable of managing their own learning processes, demonstrating independence and self-direction in their academic activities (Rahmawati & Setyaningsih, 2021). The integration of AR within comics provides meaningful opportunities for students to better grasp theoretical concepts and connect them with real-life contexts. The AR-Comic Digital Book not only serves as an engaging learning medium but also functions as an effective tool to foster learning autonomy through active and interactive experiences.

Comics are commonly understood as sequences of images and symbols systematically organized to communicate information and provide aesthetic value to readers (Mustikasari et al., 2020; Terlouw et al., 2020). The progress of technology has led to the emergence of digital comics, which are developed using digital tools to improve their visual appeal and presentation efficiency

(Fitria et al., 2023). According to Habiddin et al. (2022), digital comics are defined as visual works published in digital format, either in the form of a single image or a series of parts. The distinguishing characteristics of these comics include a seamless reading flow, the utilization of frames, and the incorporation of visual symbols such as word balloons. The writing style employed in these comics facilitates the visual delivery of messages, contributing to their effectiveness as visual narratives. These characteristics contribute to the enhanced communicative and adaptive nature of digital comics, particularly when augmented by AR technology to bolster students' autonomy in learning.

The augmented reality (AR) comic developed in this study enables students to receive information and interact directly with the learning materials through AR elements and QR codes, which direct students to additional relevant materials. This interactive feature enables students to access supplementary information and engage directly with the learning materials, thereby fostering curiosity and initiative in their learning. This pedagogical approach fosters the development of students' learning independence, as it provides them with the autonomy to explore topics of interest and organize their learning according to their individual needs and preferences. This approach diverges significantly from conventional learning methods that prioritize direct instruction from the instructor.

The unique appeal of comics in educational settings stems from their ability to engage students with their narrative structure. These visual aids have been shown to be effective not only in conveying abstract scientific concepts but also in introducing an element of humor, rendering the learning context more relatable to everyday life, and facilitating the visualization of the objects being studied (Morel et al., 2019). A multitude of studies have demonstrated that the integration of comics into the educational paradigm has been shown to enhance students' computational thinking skills in comparison to learning environments devoid of such media (Lestari et al., 2021). Nevertheless, printed comics continue to exhibit inherent limitations, particularly in the realm of three-dimensional object representation. The development of Augmented Reality (AR)-based comics has emerged as a potential solution to this challenge, offering a more interactive, engaging, and innovative approach to display (Damopolii et al., 2022). Digital comics have the potential to enhance the learning process, offering students a more engaging educational experience that extends beyond the use of conventional printed teaching materials, such as reading books (Pramesti et al., 2024).

The objective of employing digital comics is to translate verbal text into visual form, thereby facilitating learners' comprehension of the depicted events and enabling the conveyance of ideas through the accompanying illustrated narrative (Lee et al., 2021). The utilization of augmented reality (AR)-based comics enables students to comprehend theoretical concepts and relate them to real-life experiences. The QR code scanning feature affords students the opportunity to obtain additional information pertinent to their learning, thereby enriching their knowledge and cultivating further curiosity. This pedagogical approach fosters student autonomy, encouraging them to take the initiative in their own learning, thus cultivating independent learning habits.

The cultivation of students' disciplinary character is inextricably linked to the promotion of autonomy in learning. Consistent with the findings of preceding studies, the implementation of augmented reality (AR)-enhanced picture storybooks has demonstrated a substantial and constructive impact on character development while concomitantly enhancing student discipline (Lubis & Wangid, 2019). The acquisition of learning independence is defined as the capacity of students to orchestrate their learning process autonomously, encompassing the elements of planning, monitoring, and evaluating the progress achieved in their learning (Citrawati, 2024). The acquisition of autonomy is imperative for students to orchestrate, oversee, and direct their own learning processes, as evidenced by numerous studies (Harahap & Harahap, 2020). AR-Comic Digital Book offers a solution to this challenge by providing a platform for exploration and autonomy in the organization of learning.

One form of learning independence appears in the ability of students to familiarize themselves with planning their learning activities without depending on others (Rozi & Lana, 2021). A good level of independent learning enables students to assess and direct their desired

learning outcomes (Rahmawati & Setyaningsih, 2021). Learning independence, or self-regulated learning, reflects a cycle of self-regulation, in which students actively set goals, develop strategies, and control the knowledge, beliefs, and learning objectives they want to achieve (Chou & Zou, 2020). Learning independence itself can be divided into two categories, namely independent and dependent (Rahmawati & Setyaningsih, 2021). Students with independent learning autonomy are characterized by their ability to solve problems independently, complete tasks and responsibilities without relying on others, actively seek learning resources to support academic success, and have consistent, independent learning habits with high motivation. Conversely, students with dependent learning independence tend to show behaviour that relies on others, are less able to take responsibility for themselves, and have difficulty exercising self-control.

Strengthening student learning independence is very relevant to the independent curriculum based on the Pancasila learner profile. The Pancasila Student Profile is a practical implementation of the Merdeka Curriculum which aims to improve the quality of education in Indonesia, with an emphasis on character development that is aligned with the nation's basic values (Nurmala et al., 2025). The Strengthening the Pancasila Student Profile project was designed as a means of implementing the Merdeka Curriculum by emphasizing a new learning paradigm to shape student character according to Pancasila values (Sabon et al., 2022). Its implementation provides an interactive non-formal learning experience, where students engage directly with the surrounding environment as part of the learning process (Utari & Afendi, 2022).

The Pancasila Student Profile represents a collection of attributes and competencies that students are expected to cultivate, grounded in the core values of Pancasila (Budiono & Hatip, 2023). This profile includes six main dimensions, namely: (1) faith, devotion to God Almighty, and noble character; (2) independence; (3) ability to work together; (4) awareness of global diversity; (5) critical thinking; and (6) creativity (Irawati et al., 2022). Achieving these competencies requires a comprehensive and integrated learning approach that enables students not only to internalize Pancasila values but also to apply them in their daily lives. The development of an AR-Comic Digital Book aligned with the Pancasila Student Profile not only fosters character education but also effectively enhances students' learning autonomy in a tangible way.

CONCLUSIONS AND SUGGESTIONS

The present study provides evidence that developing an Augmented Reality Comic Digital Book based on the Pancasila Student Profile is a promising strategy for enhancing the learning independence of elementary school students. This medium serves not only as a conduit for disseminating educational materials but also as an interactive instrument that fosters student engagement, creativity, and autonomy in managing their learning process. The findings of the Independent Samples t-test indicated no statistically significant difference in the level of learning independence between classes V-A and V-B. This finding suggests that the implementation of the developed learning media is effective in maintaining consistency in students' achievement of learning independence across both groups. The integration of augmented reality (AR) technology, digital comics, and the value of the Pancasila Student Profile renders this product a valuable learning tool that is both enjoyable and relevant to the demands of the Merdeka Curriculum. The AR-Comic Digital Book represents a pioneering approach to fostering students' character autonomy, thereby enhancing the efficacy of 21st-century learning. The present study is subject to certain limitations, as the measurement focus is predominantly oriented toward aspects of learning independence. Further research is recommended to test the effectiveness of this media on the Pancasila Student Profile, so that its contribution to strengthening student character can be more comprehensive.

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IPBCIREBON/VI/2025.

REFERENCES

Astuti, A. W., Anggito, A., & Mustadi, A. (2022). Do augmented realty comics improve reading interest for elementary school student in pandemic era? *AL-ISHLAH: Jurnal Pendidikan*, *14*(3), 3461–3478. https://doi.org/10.35445/alishlah.v14i3.1728

Astuti, E. F., Wati, U. A., & Murti, R. C. (2024). Categorization of self-regulated learning in pancasila education learning at elementary school. *Jurnal Ilmiah Sekolah Dasar*, *8*(4), 695–707. https://doi.org/10.23887/jisd.v8i4.80464

Budiono, A. N., & Hatip, M. (2023). Asesmen pembelajaran pada kurikulum merdeka. *Jurnal Axioma: Jurnal Matematika Dan Pembelajaran*, *8*(1), 109-123. https://doi.org/10.56013/axi.v8i1.2044

Candrayani, N. M. W., & Sujana, I. W. (2023). Digital comics: Character value-based learning media in the ramayana puppet story content social studies elementary school. *Indonesian Values and Character Education Journal*, *6*(1), 63–72. https://doi.org/10.23887/ivcej.v6i1.54657

Chou, C. Y., & Zou, N. B. (2020). An analysis of internal and external feedback in self-regulated learning activities mediated by self-regulated learning tools and open learner models. *International Journal of Educational Technology in Higher Education*, *17*(1), 1–27. https://doi.org/10.1186/s41239-020-00233-y

Citrawati, T. (2024). The independent curriculum approach in supporting independent learning for inclusive students in elementary schools. *Widyagogik: Jurnal Pendidikan Dan ...*, *11*(3), 478–496. https://journal.trunojoyo.ac.id/widyagogik/article/view/26448

Damopolii, I., Paiki, F. F., & Nunaki, J. H. (2022). The Development of Comic Book as Marker of Augmented Reality to Raise Students' Critical Thinking. *TEM Journal*, *11*(1), 348–355. https://doi.org/10.18421/TEM111-44

Fitria, Y., Malik, A., Mutiaramses, Halili, S. H., & Amelia, R. (2023). Digital comic teaching materials: It's role to enhance student's literacy on organism characteristic topic. *Eurasia Journal of Mathematics, Science and Technology Education*, *19*(10), 1–11. https://doi.org/10.29333/ejmste/13573

Fitriani, W., Haryanto, H., & Atmojo, S. E. (2020). Motivasi berprestasi dan kemandirian belajar mahasiswa saat pembelajaran daring. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *5*(6), 828–834. https://doi.org/10.17977/jptpp.v5i6.13639

Habiddin, H., Ashar, M., Hamdan, A., & Nasir, K. R. (2022). Digital comic media for teaching secondary school science. *International Journal of Interactive Mobile Technologies*, *16*(3), 159–166. https://doi.org/10.3991/IJIM.V16I03.28967

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, *3*(1), 275–285. https://doi.org/10.1016/j.susoc.2022.05.004

Harahap, A. C., & Harahap, S. (2020). Covid 19: self regulated learning mahasiswa. *Jurnal Pendidikan Dan Konseling*, *10*(1), 36–42. https://doi.org/10.30829/al-irsyad.v10i1.7646

Irawati, D., Iqbal, A. M., Hasanah, A., & Arifin, B. S. (2022). Profil pelajar pancasila sebagai upaya mewujudkan karakter bangsa. *Edumaspul: Jurnal Pendidikan*, *6*(1), 1224–1238. https://doi.org/10.33487/edumaspul.v6i1.3622

Ivana, Pramudya, I., & Riyadi. (2023). The effectiveness of comic illustrated ugmented reality learning media to improve mathematical problem-solving ability. *Indonesian Journal of Educational Research and Review*, *6*(3), 584–594. https://doi.org/10.23887/ijerr.v6i3.66204

Kamila, S. N., & RM, A. H. A. (2023). Implementation of merdeka curriculum in improving the quality of senior high school. *Jurnal Educatio*, *9*(1), 394–401. https://doi.org/10.31949/educatio.v9i1.4591

Khan, T., Johnston, K., & Ophoff, J. (2019). The impact of an augmented reality application on learning motivation of students. *Advances in Human-Computer Interaction*, *2019*, 1–14.

https://doi.org/10.1155/2019/7208494

Khotimah, H., & Hidayat, N. (2022). Interactive digital comic teaching materials to increase student engagement and learning outcomes. *International Journal of Elementary Education*, *6*(2), 245–258. https://doi.org/10.23887/ijee.v6i2

Komang, N., Pratiwi, D., & Bayu, G. W. (2024). Augmented reality-based comic media : A metacognitive approach to enhance cultural literacy and reading engagement in elementary education. *International Journal of Elementary Education*, *8*(3), 536–546. https://doi.org/10.23887/ijee.v8i3.89796

Lee, Y., Joh, H., Yoo, S., & Oh, U. (2021). AccessComics: An accessible digital comic book reader for people with visual impairments. *Proceedings of the 18th International Web for All Conference, W4A 2021*, *2*(1), 19–20. https://doi.org/10.1145/3430263.3452425

Lestari, F. P., Ahmadi, F., & Rochmad, R. (2021). The implementation of mathematics comic through contextual teaching and learning to improve critical thinking ability and character. *European Journal of Educational Research*, *10*(1), 497–508. https://doi.org/10.12973/EU-JER.10.1.497

Lubis, A. H., & Wangid, M. N. (2019). Augmented reality-assisted pictorial storybook: Media to enhance discipline character of primary school students. *Mimbar Sekolah Dasar*, *6*(1), 11–20. https://doi.org/10.17509/mimbar-sd.v6i1.13787

Morel, M., Peruzzo, N., Juele, A. R., & Amarelle, V. (2019). Comics as an educational resource to teach microbiology in the classroom. *Journal of Microbiology & Biology Education*, *20*(1), 1–4. https://doi.org/10.1128/jmbe.v20i1.1681

Mustikasari, L., Priscylio, G., Hartati, T., & Sopandi, W. (2020). The development of digital comic on ecosystem for thematic learning in elementary schools. *Journal of Physics: Conference Series*, *1469*, 1–6. https://doi.org/10.1088/1742-6596/1469/1/012066

Naisa'ada, R., & Mulyani, P. K. (2025). Development of digital comics integrated with pancasila student profiles in the merdeka curriculum to enhance narrative text comprehension. *Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran*, *11*(2), 885–896. https://doi.org/10.33394/jk.v11i2.15723

Nurmala, V., Astiti, N. Y., Fitri, D. M., & Wuryandani, W. (2025). Implementation of the pancasila student profile strengthening project (P5) in elementary schools. *Journal of Integrated Elementary Education*, *5*(1), 166–187. https://doi.org/10.21580/jieed.v5i1.23644

Okpatrioka. (2023). Research and development (R&D) penelitian yang inovatif dalam pendidikan. *Dharma Acariya Nusantara: Jurnal Pendidikan, Bahasa Dan Budaya*, *1*(1), 86–100. https://doi.org/10.47861/jdan.v1i1.154

Pramesti, N. P. I., Kristiantari, M. G. R., & Sujana, I. W. (2024). Komik digital berbasis kontekstual untuk meningkatkan hasil belajar bahasa Indonesia siswa Kelas II sekolah dasar. *Jurnal Media Dan Teknologi Pendidikan*, *4*(2), 285–294. https://doi.org/10.23887/jmt.v4i2.80447

Pratiwi, N. W. C., Margunayasa, I. G., & Lasmawan, I. W. (2024). Media pembelajaran augmented reality berbasis profil pelajar pancasila untuk meningkatkan minat belajar IPA kelas iv sd. *Jurnal Ilmiah Pendidikan Profesi Guru*, *7*(1), 110–122. https://doi.org/10.23887/jippg.v7i1.73179

Rahmawati, L. E., & Setyaningsih, V. I. (2021). Kemandirian belajar siswa dalam pembelajaran daring mata pelajaran bahasa Indonesia. *KEMBARA Journal of Scientific Language Literature and Teaching*, *7*(2), 353–365. https://doi.org/10.22219/kembara.v7i2.16326

Rozi, F., & Lana, I. F. (2021). Implementasi pembelajaran jarak jauh (PPJ) dalam meningkatkan kemandirian belajar siswa. *Fondatia: Jurnal Pendidikan Dasar*, *5*(1), 109–124. https://doi.org/10.36088/fondatia.v5i1.1108

Sabon, Y. O. S., Istiyono, E., & Widihastuti, W. (2022). Developing "pancasila student profile" instrument for self-assessment. *Jurnal Penelitian Dan Evaluasi Pendidikan*, *26*(1), 37–46. https://doi.org/10.21831/pep.v26i1.45144

Safitri, I., & Nurharini, A. (2024). Differentiated learning assisted by digital strip comic media

improves elementary school student learning outcomes. *Jurnal Pendidikan Dan Pengajaran*, *57*(2), 237–348. https://doi.org/10.23887/jpp.v57i2.79914

Sari, P. K., & Putri, N. R. (2025). Pixton digital comic media in PPKN lessons to improve the character profile of pancasila students. *Jurnal Penelitian Dan Pengembangan Pendidikan*, *9*(1), 125–135. https://doi.org/10.23887/jppp.v9i1.85144

Sofwatillah, Risnita, Jailani, M. S., & Saksitha, D. A. (2024). Teknik analisis data kuantitatif dan kualitatif dalam penelitian ilmiah. *Journal Genta Mulia*, *15*(2), 79–91. https://ejournal.uncm.ac.id/index.php/gm/article/view/1147

Terlouw, G., Veer, J. T. van 't, Prins, J. T., Kuipers, D. A., & Pierie, J. P. E. N. (2020). Design of a digital comic creator (it's me) to facilitate social skills training for children with autism spectrum disorder: Design research approach. *JMIR Mental Health*, *7*(7), 1–18. https://doi.org/10.2196/17260

Utari, D., & Afendi, A. R. (2022). Implementation of pancasila student profile in elementary school education with project-based learning approach. *EduLine: Journal of Education and Learning Innovation*, *2*(4), 456–464. https://doi.org/10.35877/454ri.eduline1280

Wu, J., Jiang, H., Long, L., & Zhang, X. (2024). Effects of AR mathematical picture books on primary school students' geometric thinking, cognitive load and flow experience. *Education and Information Technologies*, *29*(18), 24627–24652. https://doi.org/10.1007/s10639-024-12768-y