



Development of pop-up book to improve ethnic diversity learning for grade V elementary student

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Abstract: Learning in Pancasila Education at the elementary school level tends to be less varied and has not fully supported the improvement of student learning outcomes due to the limited use of innovative learning media. This study aims to develop a Pop-Up Book learning medium with the theme of ethnic diversity, examine its feasibility, and determine its effectiveness in improving the learning outcomes of fifth-grade students. This study employs a research and development design involving 29 fifth-grade students, a classroom teacher, media experts, and material experts. Data are collected through learning outcome tests, observations, interviews, questionnaires, and documentation. The data are analyzed using qualitative and quantitative descriptive analyses and inferential statistics, including normality tests, paired-sample t-tests, and N-gain analysis. The developed Pop-Up Book contains materials on ethnic diversity, including traditional houses, traditional clothing, traditional foods, and regional dances, supported by barcodes that provide additional examples. The results show that the media is highly feasible according to expert validation. The effectiveness test indicates a 25% increase in students' learning outcomes between pretest and posttest scores, with N-gain results in the moderate category. In conclusion, the Pop-Up Book learning media is feasible and effective in improving students' learning outcomes in Pancasila Education, particularly on ethnic diversity material. The findings imply that interactive and visually engaging media can serve as an alternative learning resource to enhance student participation and academic achievement in elementary schools.

Keywords: pop-up book, learning outcomes, ethnic diversity

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Introduction

Education plays a strategic role in shaping a generation of nations that are intelligent, have character, and recognize the value of diversity. Education is a process carried out consciously and planned to foster learning that enables students to develop their potential optimally (Banihashem et al., 2025; Kerimbayev et al., 2025). Education is open to all Indonesian citizens regardless of ethnicity, race, language, culture, or other background. The development of education in Indonesia must adapt to learners' diverse backgrounds, without exception, even though they have different learning needs and characteristics (Andini et al., 2023). Education is an important part of efforts to provide understanding to the community in dealing with differences (Anggito & Sartono, 2022). In the context of Indonesia as a multicultural country, education serves not only as a means of knowledge transfer but also as a medium for internalizing values of tolerance, unity, and respect for differences. Pancasila education plays an important role in the formation of national character through the inculcation of Pancasila values from an early age (Putri & Adam, 2022; Rofidah et al., 2022).

Strengthening Pancasila Education learning is in line with national policies as stated in the Regulation of the Minister of Education, Culture, Research, and Technology Number 12 of 2024, especially in Pancasila Education Learning Outcomes which emphasize contextual learning and are

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relevant to the times. However, in practice, Pancasila Education in elementary schools remains predominantly teacher-centered and relies heavily on conventional textbooks and static visual media. Consequently, abstract topics such as ethnic diversity are often difficult for students to comprehend meaningfully, resulting in low learning motivation and limited active participation in classroom activities (Hidayati et al., 2022).

Learning media has an important role in creating an effective and meaningful learning process. Learning that is relevant to the times requires the use of media that can attract students' attention and support the achievement of learning goals (Azkiyatul & Andaryani, 2025; Hia et al., 2025). One alternative that is considered relevant is interactive learning media, which is designed to actively engage students through visual elements and learning activities. The use of this media aligns with the principles of the Independent Curriculum, which emphasize student-centered learning. In the context of Pancasila Education, learning media not only functions as a means of delivering material, but also as a vehicle for strengthening critical and collaborative thinking skills.

The results of initial observations conducted at Donorejo 1 State Elementary School show that the implementation of learning on ethnic diversity materials has not taken place optimally. In the learning process, some students seem to pay less attention to the teacher's explanation and tend to be passive during learning activities. The results of interviews with classroom teachers revealed that students' motivation to learn remains relatively low, and their understanding of the material varies (Nindhita et al., 2023; Rahman & Andaryani, 2024; Rizqi et al., 2023). Some students understand the material well, but others still have difficulty relating the concept of ethnic diversity to real-life examples in their surroundings. One of the factors that affect these conditions is the limited learning media used. Teachers still rely on the media in the form of static posters as the main means of delivering material. The media has not been able to actively involve students because the presentation is one-way and does not provide space for students to interact directly with the learning material (Asri & Andaryani, 2024; Rahmawati & Andaryani, 2025). As a result, the learning process tends to be monotonous and less varied, so students easily feel bored and less interested in participating in learning optimally.

In addition, the use of less context-rich media can lead some students to understand ethnic diversity material abstractly. The posters display only limited information and are not accompanied by learning activities that allow students to explore and relate the material to everyday experiences. This condition results in learning not fully providing a meaningful experience, even though ethnic diversity materials require a concrete understanding close to students' socio-cultural reality. Therefore, it is necessary to develop learning media that are more engaging, interactive, and aligned with the characteristics of elementary school students, so that the learning process can be more effective and contextual.

These issues suggest the development of educational materials that are more engaging, tangible, and appropriate for elementary school students. The Pop-Up Book, a learning tool that takes the form of a three-dimensional book and conveys information visually and interactively, is one of the media types that could be developed (Artobatama et al., 2023). This medium aligns with the traits of fifth-grade pupils at the concrete operational stage, when direct tasks and visualization enhance conceptual learning. The importance of using interesting books is felt by elementary school students (Anom et al., 2022). In this study, the Pop-Up Book was developed with the integration of barcodes (QR codes) that students can scan to access concrete examples in the form of images, short videos, or digital illustrations relevant to ethnic diversity materials. Interactive learning media that integrate simple visual and technological elements, such as QR codes, have the potential to increase student engagement and learning outcomes by presenting more concrete and meaningful learning (Koç & Kanadlı, 2025; Rakha, 2025). Using media that combines a three-dimensional display with simple digital activities, such as QR codes, can expand students' interaction with learning materials and enrich their learning experience.

A number of studies show that Pop-Up Book media is effective in improving learning quality. The Pop-Up Book has been proven to increase understanding of the concept of Pancasila Education through concrete visual presentations (Kholilah & Aeni, 2025; Priyanti et al., 2025), as well as to improve students' learning motivation and memory (Agustina & Lusiana, 2024; Kamal et al., 2024). In addition, this media is also effective in helping students understand the concept of cultural diversity in a more meaningful way (Julianti et al., 2024). However, these studies generally still focus on conventional Pop-Up Books without integrating simple technologies that directly expand students' learning resources.

Previous studies have shown that Pop-Up Book media can enhance students' understanding of cultural and Pancasila Education concepts through concrete visual representation and interactive learning activities. Pop-Up Books have also been reported to improve learning motivation and memory retention in elementary school contexts. These findings indicate that three-dimensional visual media are effective in supporting students' conceptual learning. Although Pop-Up Book media has been widely applied in elementary school learning, most existing studies focus on conventional Pop-Up Books, without integrating simple digital technologies that allow students to access extended learning resources. Moreover, empirical research specifically examining the effectiveness of technology-supported Pop-Up Book media for ethnic diversity materials in Pancasila Education remains limited. This reveals a research gap in the development of learning media that combines concrete visual representation with digital enrichment.

Although various studies have demonstrated that Pop-Up Book media is effective for elementary school learning, most existing research still focuses on conventional Pop-Up Books without integrating simple digital technologies that can extend students' learning resources. Moreover, studies that specifically develop Pop-Up Book media for Pancasila Education on ethnic diversity material and examine its effectiveness quantitatively remain limited. This indicates a research gap in the development of technology-supported Pop-Up Book media for Pancasila Education learning.

This study offers novelty by developing a Pop-Up Book learning medium integrated with barcodes (QR codes) that connect printed materials with additional digital resources, such as images and short videos related to ethnic diversity. This integration enables students to explore learning content beyond the printed book while maintaining concrete and age-appropriate learning experiences.

Therefore, this study aims to: (1) develop a barcode-based Pop-Up Book learning medium on ethnic diversity material for Grade V elementary students, (2) examine the feasibility of the developed media based on expert validation and user responses, and (3) determine its effectiveness in improving students' learning outcomes in Pancasila Education. The findings of this study are expected to contribute to the development of innovative learning media for Pancasila Education in Indonesia and to support the implementation of contextual and student-centered learning in elementary schools.

Methods

This study used a research and development (R&D) design based on the ADDIE model, which consisted of analysis, design, development, implementation, and evaluation. Research and development (R&D) was a form of research methodology used to develop and produce products, design new products, and assess the effectiveness of existing products (Sugiyono, 2021). This approach was selected because the study's objective was to develop and evaluate a Pop-Up Book learning medium for material on ethnic diversity in Pancasila Education. The ADDIE model was considered appropriate as it provides systematic and structured stages for designing, developing, implementing, and evaluating instructional media.

In the analysis stage, students' needs and curriculum requirements related to ethnic diversity material were identified through classroom observation and interviews with teachers. In the design stage, the structure and content of the Pop-Up Book were planned, including learning objectives, material organization, visual layout, and barcode (QR code) integration. In the development stage, the Pop-Up Book was produced and validated by material and media experts to assess its feasibility. In the implementation stage, the developed media was applied in classroom learning with Grade V students. Finally, in the evaluation stage, the media's effectiveness was assessed based on students' learning outcomes and responses.

The study took place at Donorejo 1 State Elementary School, which was located in Lengkong Kulon, Donorejo, Karangtengah District, Demak Regency, Central Java. The subjects of this study were 29 fifth-grade students at Donorejo 1 State Elementary School. Data were collected using test and non-test methods. The research instruments consisted of (1) pretest and posttest items to measure students' learning outcomes on ethnic diversity material, (2) validation sheets for material and media experts to evaluate the feasibility of the developed Pop-Up Book, (3) student response questionnaires to assess the usability and attractiveness of the media, and (4) observation and interview guidelines to support qualitative data collection.

To determine the effectiveness of the Pop-Up Book, the data were analyzed using a t-test, N-Gain test, and normality test. Since the sample size was fewer than 50, the Shapiro-Wilk test was used to examine the normality of the data. This test aimed to determine whether the data were normally distributed. The data were considered normally distributed if the significance value (Sig.) was greater than 0.05, and not normally distributed if Sig. was less than or equal to 0.05. After confirming that the data were normally distributed, a paired-sample t-test was conducted to determine whether there was a significant difference between the pretest and posttest scores before and after the treatment. The null hypothesis was rejected and the alternative hypothesis was accepted if the significance value (Sig. 2-tailed) was less than 0.05. Additionally, the N-Gain test was conducted to analyze the improvement in students' learning outcomes after the treatment by considering the difference between pretest and posttest scores and the maximum possible score. The N-Gain criteria are presented in the following table.

Table 1. N-Gain Criteria

N-Gain Value	Criteria
$N\text{-gain} \geq 0.70$	High
$0.30 < N\text{-gain} < 0.70$	Medium
$N\text{-gain} \leq 0.30$	Low

(Lestari & Yudhanegara, 2017)

Results and Discussion

Results

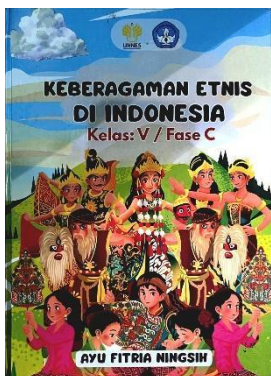
This research produces a learning media in the form of a Pop-Up Book on ethnic diversity, designed to support the learning of Pancasila Education for fifth-grade elementary school students. The learning media is developed using the ADDIE model, which includes the stages of analysis, design, development, implementation, and evaluation. Each stage of development is carried out systematically by adjusting to the learning needs, student characteristics, and learning objectives to be achieved in the ethnic diversity material.

The development of the Pop-Up Book media aims to demonstrate its practicality and usefulness in the learning process, as well as to produce an educational media product. The effectiveness of the media is evaluated by analyzing student learning outcomes before and after its use. The feasibility of the media is assessed through validation by material and media experts, as well as through teachers' and students' responses. The Pop-Up Book learning media is expected to be theoretically and practically effective in improving students' learning outcomes in Pancasila Education, particularly in the topic of ethnic diversity.

At the analysis stage, a study is carried out on the curriculum, materials, and learning needs in schools. The results of the observations show that Pancasila Education learning on ethnic diversity materials is still dominated by lecture methods, with textbooks as the main learning resource. In addition, the use of two-dimensional media, such as posters, is less able to attract students' attention. This condition influences students' limited participation in the learning process, especially with abstract information that requires visualization to help grasp concepts. Based on these findings, the Pop-Up Book learning media was created as an alternative medium predicted to boost student engagement and help students visualize information on ethnic diversity in a more concrete way.

At the planning stage, the media is designed with a focus on materials on traditional houses, traditional clothing, traditional foods, and traditional dances, aligned with the Learning Outcomes (CP) and Learning Objectives (TP). Furthermore, at the development stage, the media is realized as a Pop-Up Book comprising a cover, material pages, and a barcode for each topic that contains supporting examples. At the end of the book, an educational game is provided to group forms of ethnic diversity based on their region of origin. The final product of the ethnically diverse Pop-Up Book media is presented in the following table.

Table 2. Pop-Up Book Media End Products

Visualization	Description
	The book cover features the title "<i>Ethnic Diversity in Indonesia</i>" for class V (Phase C) with illustrations of regional cultural figures representing the ethnic diversity of the archipelago. The visual design uses bright colors and cartoon characters to grab students' attention and affirm the theme of unity in diversity.
	The design of the material section presents information about Indonesia's ethnic diversity which includes traditional houses, traditional clothing, typical foods, and regional dances. Each sub-material is presented in the form of a three-dimensional illustration (pop-up) accompanied by a brief explanation and a barcode that can be scanned to access additional examples in the form of supporting images or videos.
	The game section contains activities that group cultural elements (traditional houses, traditional clothing, typical food, and regional dances) based on their region of origin. This game is designed to train understanding of the concept of ethnic diversity while increasing student engagement through learning while playing.

Feasibility of developing Pop-Up Books on Ethnic Diversity Materials

Through a variety of assessment procedures, including subject matter experts, media experts, and user responses, that is, instructors and students, the viability of the Pop-Up Book learning materials was evaluated. The purpose of this feasibility evaluation is to ensure that the educational materials developed are appropriate for use in the Pancasila Education learning process, particularly in the ethnic diversity curriculum for grade V primary school. Through this approach, the viability of media is assessed not only from a theoretical perspective but also in terms of its utility for classroom learning activities and practical considerations. To determine whether the content of the Pop-Up Book media is appropriate for the learning abilities of Pancasila Education students on ethnic diversity material in class V, a validation is conducted. This evaluation assesses how effectively the content aligns with learning objectives, how comprehensive and accurate the concept is, and how well it fits the developmental traits of elementary school students. With the validation of the material, it is hoped that the media developed will effectively support the achievement of the learning competencies set out in the curriculum.

Meanwhile, media validation was carried out to determine the feasibility level of Pop-Up Book media from technical and display aspects. The aspects assessed include visual design, layout, text readability, clarity of illustrations, and ease of use of media in the learning process. This assessment aims to ensure that the developed media is not only visually appealing but also easy to use by teachers and students, without causing difficulties in classroom application. The process of validating materials and media is carried out by experts who have competence in their fields, so that the assessment results can serve as an objective basis for determining the feasibility of Pop-Up Book learning media. The experts' validation results are then provided in the form of a table, providing a systematic overview of the level of feasibility of the media generated based on each area of the evaluation.

Table 3. Expert Validation

No.	Validation	Introduce yourself	Criteria
1.	Material Expert	90%	Highly Valid
2.	Media Member	93%	Highly Valid

Based on Table 3, the material feasibility percentage was 90%, and the media validation results showed that the pop-up book learning media had a feasibility percentage of 93%. This proportion indicates that the pop-up book learning materials and media fall into the extremely feasible category, leading to the conclusion that field testing is viable. The content has been developed in accordance with the learning objectives, in an easily understood language, and presented in a methodical, contextually appropriate manner that is appropriate for fifth-grade students in elementary school. In terms of visual design, tidy look, color compatibility, text clarity, and usability for fifth-grade elementary school students, the medium has satisfied the qualifying requirements. Therefore, using the Pop-Up Book of Ethnic Diversity Materials for education is quite possible. Teachers' and students' reactions to the Pop-Up Book's use in the classroom further demonstrate its viability.

Table 4. Response

No.	Response	Introduce yourself	Criteria
1.	Teacher	91%	Highly Worth It
2.	Students	89%	Highly Worth It

Based on Table 4, Pop-Up Book received 89% of student responses and 91% of teacher responses. This proportion indicates that using educational media to teach Pancasila Education ethnic diversity curriculum in grade V elementary school is very possible. These findings demonstrate that the Pop-Up Book learning tool is thought to be visually appealing, user-friendly, and beneficial for teachers in imparting knowledge to pupils. Furthermore, it is believed that this learning resource might improve students' attention and enhance their comprehension of the subject. The Pop-Up Book was deemed highly viable for Pancasila Education on ethnic diversity materials in grade V elementary schools, according to the teacher and student responses.

The Pop-Up Book Media is highly valid, making it ideal for educational use, according to validation by material experts and media specialists. The excellent feedback that students and teachers provided following their use of the Pop-Up Book supports this. As a result, the Pop-Up Book Media with ethnically diverse content is ideal for educational usage.

Effectiveness of developing Pop-Up Books on Ethnic Diversity Materials

The efficacy of developing Pop-Up Book learning media on ethnic diversity materials was assessed by comparing grade V students' learning results before and after media use. The data on learning outcomes were obtained through the administration of preliminary tests (pretest) and final tests (posttest), which were then analyzed using SPSS software version 27. The data analysis focused on determining improvements in student learning outcomes after participating in learning using barcode-based Pop-Up Book media. This study employed normality tests, t-tests, and N-Gain tests to determine the efficacy of the generated learning media.

To determine the distribution of student pretest and posttest score data, the normality test is performed as the first step in the analytic process. The viability of the data for evaluation with parametric statistical tests is determined by the normality test results. Additionally, the N-Gain test was used to

quantify the degree of change in student learning outcomes, and the t-test was utilized to compare student learning outcomes before and after the usage of Pop-Up Book media. Table 1 displays the findings of the students' pretest and posttest scores' normality test.

Table 5. Normality Test

No.	Action	Significance	Criteria
1.	Pretest	0.128	Normal
2.	Posttest	0.505	Normal

Based on Table 5, the Shapiro–Wilk normality test showed significance values of 0.128 for the pretest and 0.505 for the posttest, indicating that the data were normally distributed. It may be inferred that the pretest and posttest data are normally distributed, as the p-value for the difference between the two is greater than 0.05 ($p > 0.05$). As a result, the study's data satisfies the normality assumption, allowing parametric statistical analysis to be used for the t-test (Paired sample t-test), which is the next testing step.

Table 6. T-Test

No.	Action	Red	Improvement	Sig. (2-tailed)
1.	Pretest	59.13		
2.	Posttest	82.43	23.30	<0.001

Based on Table 6, the results of the paired-sample t-test showed a significance value (Sig. 2-tailed) of less than 0.001, indicating a statistically significant difference between students' pretest and posttest scores. The p-value is less than 0.05, indicating a significant difference between the students' pretest and posttest results. This discrepancy demonstrates that, compared with before the treatment was administered, students' learning outcomes significantly improved after engaging in learning using the Pop-Up Book medium.

Furthermore, a higher average posttest score than the average pretest score suggests that the learning intervention is improving student learning outcomes. These results demonstrate how Pop-Up Book technology could improve students' comprehension of instructional content on ethnic diversity. The statistical test results supported the alternative hypothesis (H_a) and rejected the null hypothesis (H_0), showing that the Pop-Up Book learning media was effective in improving student learning outcomes.

Table 7. N-Gain Test

No.	Action	N-Gain	Criteria
1.	Pretest		
2.	Posttest	0.5795	Medium

Based on Table 7, the average N-Gain, calculated from students' pretest and posttest scores, was 0.5795, which is classified as a medium improvement. These data show a considerable improvement in student learning outcomes after using the Pop-Up Book medium. This improvement shows that, compared to pre-use of the learning media, the adopted learning method can help students better grasp the subject of ethnic diversity.

The moderate improvement category indicates that Pop-Up Book media makes a positive contribution to the student learning process, even though the increase is not extreme. This can be understood because students' understanding develops gradually through learning activities that involve visual observation, direct interaction with the media, and reinforcement of examples presented in learning. Thus, students have the opportunity to build a more structured and meaningful understanding of concepts.

Based on the findings of the N-Gain analysis, it is possible to infer that the construction of Pop-Up Book learning media in the Pancasila Education topic, with an emphasis on ethnic diversity content, can improve the learning outcomes of grade V students at Donorejo 1 State Elementary School, which is classified as medium. These findings show that the created medium is an excellent learning aid, allowing students to have a more thorough understanding of the content. Thus, the invention of Pop-Up Book learning medium in the Pancasila Education subject of ethnic diversity content is capable of

Discussion

Based on the learning requirements of Grade V students, which demand a tangible, contextual learning experience, a barcode-based Pop-Up Book on ethnic diversity was created. Students in elementary school are still in the concrete operational cognitive stage; thus, learning will be more successful if the content is delivered in forms that can be immediately examined, felt, and handled. However, current classroom practices are still dominated by teacher-centered approaches and rely heavily on textbooks and two-dimensional media, which often limits students' active participation and makes abstract concepts difficult to understand meaningfully (Fauziah et al., 2025; Kusumawardani et al., 2025; Wulansari & Tyas, 2025).

The presentation of material through three-dimensional visuals in the form of a Pop-Up Book was chosen because it helped students turn abstract concepts into more concrete, easier-to-understand ones. Illustrations of traditional houses, traditional clothing, and other cultural elements, displayed in three dimensions, provide a vivid picture of Indonesia's ethnic diversity. This is in line with the findings of Masruroh et al. (2024), who stated that concrete, visual-based learning media can improve elementary school students' understanding of concepts by allowing them to build knowledge through direct observation and engaging visual experiences. Thus, the Pop-Up Book serves as a bridge between abstract concepts in Pancasila Education materials and real learning experiences that align with students' characteristics.

In the three-dimensional Pop-up Book, the barcode displays supporting examples of ethnic diversity material presented in the Pop-up Book. The integrated barcodes enable students to access supplementary examples in the form of brief pictures or videos that are relevant to the subject throughout the scanning process. The presentation of these additional examples helps students clarify and strengthen their understanding of the material without overloading the printed material. The use of simple technologies, such as QR codes, in learning is considered effective because it provides quick access to contextual, relevant learning examples (Koç & Kanadlı, 2025). Thus, the use of barcodes in Pop-Up Book media serves as a learning support, helping students understand the material more concretely and gradually.

In addition to three-dimensional visual presentation and supporting examples through barcodes, Pop-Up Book media also includes image grouping game activities. In this activity, students are asked to group images of traditional foods, traditional clothing, traditional houses, and regional dances that come from the same region. The exercise is intended to actively engage students in the learning process while also developing their capacity to identify and integrate diverse features of ethnic diversity (Ialuna et al., 2024; Zeng et al., 2025; Zhou & Colomer, 2024). Through this grouping activity, students not only observe the material visually but also engage in the thought process of comparing, classifying, and deducing relationships among cultural elements. The process helps students build a deeper understanding of ethnic diversity by directly involving them in concrete, meaningful learning activities. The game activity categorizes these pictures based on the characteristics of primary school pupils in the concrete operational stage, when conceptual comprehension is enhanced by direct involvement in manipulative and visual activities.

The expert validation results indicate that the developed Pop-Up Book media meets both pedagogical and technical requirements for classroom use (Azzahra & Reinita, 2025). The alignment between the content, learning objectives, and students' developmental characteristics suggests that the media is appropriate for supporting Pancasila Education learning on ethnic diversity topics. In terms of visual and technical aspects, the media design, readability, and ease of use demonstrate that the Pop-Up Book can be practically implemented in real classroom settings. This finding is consistent with the views of Akbar et al. (2024), who argued that effective learning media should meet criteria of material compatibility, visual clarity, and ease of use.

The positive responses from teachers and students further confirm the practical value of the developed media. Teachers found the Pop-Up Book helpful for explaining abstract concepts related to ethnic diversity, while students found the media engaging and easy to understand. These findings indicate that the developed media is both theoretically feasible and practically applicable in elementary school learning contexts, thus addressing the second research objective of this study. This result is also supported by previous research showing that interactive learning media tailored to students'

characteristics can enhance motivation and engagement in primary school learning (Hartono et al., 2025).

The results of the efficacy test demonstrated that the use of barcode-based Pop-Up Book media had a beneficial influence on student learning outcomes, consistent with the research (Salimi et al., 2024). This demonstrates that the use of multimedia learning can improve students' learning outcomes in elementary schools by boosting student engagement and activity during the learning process. The rise in posttest scores compared to the pretest demonstrated that students had a gain in knowledge after participating in media-based learning. This improvement indicates that presenting the material in concrete visual form helps students understand the concept of ethnic diversity more clearly and in a structured way. Material that was previously only understood through text or verbal explanations becomes easier to understand because it is presented through three-dimensional illustrations that are close to the student's learning experience. These findings are in line with research that states that interactive Pop-Up Book media designed to visualize abstract concepts in an interesting way has been proven to be effective in increasing students' interest and understanding of learning materials (Hikmah & Latifah, 2025; Mansour et al., 2025; Stanič & Špernjak, 2025)

The improvement in student learning outcomes can also be explained through the characteristics of the media that encourage active student involvement. The activity of opening, swiping, and observing the sections of the Pop-Up Book makes students directly involved in the learning process. This activity is in accordance with the principle of active learning, where students are not only recipients of information but also learners. Barcode integration further strengthens that engagement as students are encouraged to explore additional material through the devices they use. This is in line with the global trend of using interactive learning media that emphasizes active student involvement as the key to improving learning outcomes (Rachmawati, 2025). This is also in accordance with one of the goals of education, namely education aims to improve student learning outcomes (Wulandari et al., 2021). In addition to its cognitive impact, the employment of barcode-based Pop-Up Book media influences students' learning motivation. The findings of the observation revealed that students were more excited, asked more questions, and participated more in conversations while studying. The media used is considered interesting and not boring compared to conventional learning, which relies solely on lecture or poster methods. This active involvement shows that the learning media developed can create a pleasant learning atmosphere and support student-centered learning, as emphasized in the Independent Curriculum (Herawan et al., 2024; Ibrahim et al., 2026; Zhi et al., 2025).

The findings of this study are in line with the results of research conducted by Endah Agustiyani (2025) who stated that the use of Pop-Up Book media is able to increase the understanding and learning motivation of elementary school students because the presentation of the material is delivered visually and concretely (Agustiyani, 2025; Iskandar & Fathurrahman, 2025). The Media Pop-Up Book helps students build an understanding of concepts through attractive three-dimensional illustrations and activities that open and observe media components (Hia et al., 2025; Masrurroh et al., 2024). However, this research differs in the aspect of media development, namely the integration of barcodes as a link between print media and digital learning resources. Barcode integration allows students to access additional images or videos relevant to ethnic diversity materials directly through scanning. Thus, the Pop-Up Book not only serves as an interactive visual medium but also expands learning resources and strengthens students' digital literacy in a simple, learner-centered manner, aligned with the learning characteristics of elementary school grade V students.

Thus, the improvement of student learning outcomes can be understood as the impact of the fit between the design of learning media and students' needs and learning characteristics. Barcode-based Pop-Up Book media can overcome the limitations of conventional learning by providing a concrete, interactive, and contextual learning experience. Therefore, this media is suitable for use as an alternative to learning materials on Pancasila Education and ethnic diversity in elementary schools, as well as an innovative learning media that effectively integrates visual elements and simple technology.

Conclusion

This study concludes that the developed barcode-based Pop-Up Book learning media is both feasible and effective for teaching ethnic diversity in Grade V Pancasila Education. The media meets

expert validation criteria and receives positive responses from teachers and students, indicating its practicality for classroom use. Furthermore, its implementation leads to improved students' learning outcomes and increased learning engagement. These findings demonstrate that the research objectives of developing, validating, and evaluating the effectiveness of the Pop-Up Book media have been successfully achieved.

References

- Agustina, Y., & Lusiana, D. (2024). The development of problem-based learning model e-module integrated with multiculturalism in elementary schools. *Jurnal Prima Edukasia*, 12(2), 183–193. DOI: <https://doi.org/10.21831/jpe.v12i2.62368>
- Agustiyan, E. (2025). Pengembangan media pembelajaran pop up book materi keanekaragaman suku bangsa dan budaya kelas V. *Jurnal Pancar (Pendidik Anak Cerdas Dan Pintar)*, 9(1), 1–6. DOI: <https://doi.org/10.52802/pancar.v9i1.1198>
- Akbar, M. R., Hanafi, S. H., Widayati, U., & Ramli. (2024). The feasibility of interactive flashcard learning media in its use for learning integrated with local culture (Bima culinary lexicon). *JPPI: Jurnal Pendidikan dan Pembelajaran Indonesia*, 4(4), 1405–1417. DOI: <https://doi.org/10.53299/jppi.v4i4.781>
- Andini, D. W., Hufad, A., Rochyadi, E., & Diana, I. (2023). The development of the sariswara method in accommodating the students' diversity in thematic learning material of elementary school. *Jurnal Prima Edukasia*, 11(1), 72–80. DOI: <https://doi.org/10.21831/jpe.v11i1.53254>
- Anggito, A., & Sartono, E. K. E. (2022). The development of multicultural education comics to embed tolerance character for 4th grade of elementary school. *Jurnal Prima Edukasia*, 10(1), 66–81. DOI: <https://doi.org/10.21831/jpe.v10i1.40504>
- Anom, I., Aji, B., & Pujiastuti, P. (2022). Development of natural science supplement books based on local wisdom in integrative thematic learning in the elementary schools. *Jurnal Prima Edukasia*, 10(1), 82–95. DOI: <https://doi.org/10.21831/jpe.v10i1.40173>
- Artobatama, I., Hastuti, W. S., Zubaidah, E., & Wibowo, S. E. (2023). STEM learning design with literation-based pop-up book media in elementary schools. *Jurnal Prima Edukasia*, 11(2), 152–160. DOI: <https://doi.org/10.21831/jpe.v11i2.56628>
- Asri, K., & Andaryani, E. T. (2024). The influence of e-modules on improving motivation and learning outcomes in SBDP subjects in elementary schools. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 9(3), 1–13. DOI: <https://doi.org/10.23969/jp.v9i03.15866>
- Azkiyatul, S., & Andaryani, E. T. (2025). Development of interactive media SIPEMA to improve learning outcomes in IPAS human respiration material for 5th grade at SDN Tinjomoyo 01 Semarang City. *Journal of Classroom Action Research*, 7(3), 1115–1123. DOI: <https://doi.org/10.29303/jcar.v7i3.11848>
- Azzahra, A., & Reinita. (2025). Analysis of the validity of PBL-based interactive teaching materials on materials respecting diversity in grade IV elementary school. *Journal of Educational Sciences*, 9(5), 377–3387. DOI: <https://doi.org/10.31258/jes.9.5.p.377-3387>
- Banihashem, S. K., Bond, M., Bergdahl, N., Khosravi, H., & Noroozi, O. (2025). A systematic mapping review at the intersection of artificial intelligence and self-regulated learning. *International Journal of Educational Technology in Higher Education*, 22, Article 50. DOI: <https://doi.org/10.1186/s41239-025-00548-8>
- Fauziah, R., Respati, R., & Setiadi, P. M. (2025). Analysis of the need for interactive multimedia

- development as a learning media for IPAS in 5th grade elementary school. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 10(3), 389–402. DOI: <https://doi.org/10.23969/jp.v10i03.26566>
- Hartono, Ningasi, & Hina, S. (2025). Developing interactive learning media to enhance elementary school students' learning motivation. *EDUCARE: Journal of Primary Education*, 6(1), 81–96. DOI: <https://doi.org/10.35719/educare.v6i1.291>
- Herawan, Cale, W., & Barroso, U. (2024). The effectiveness of interactive videos in increasing student engagement in online learning. *Journal of Computer Science Advancements*, 2(5), 244–258. DOI: <https://doi.org/10.70177/jasca.v2i5.1322>
- Hia, D., Rohim, D. C., Wibowo, D., Rahmawati, S., & Manggalastawa, M. (2025). The influence of local culture-based pop-up book media from North Sumatra to improve the learning outcomes of fourth grade students in the IPAS subject at elementary school. *Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI)*, 5(2), 635–643. DOI: <https://doi.org/10.53299/jppi.v5i2.1381>
- Hidayati, R., Triyanto, M., Sulastri, A., & Husni, M. (2022). Factors causing the decline in learning motivation of fourth grade students at SDN 1 Peresak. *Jurnal Educatio FKIP UNMA*, 8(3), 1153–1160. DOI: <https://doi.org/10.31949/educatio.v8i3.3223>
- Hikmah, N., & Latifah, N. (2025). The development of interactive pop-up book media on food chain material to enhance learning interest in grade V of elementary school students. *IJPSE: Indonesian Journal of Primary Science Education*, 5(2), 266–233. DOI: <https://doi.org/10.33752/ijpse.v5i2.8817>
- Ialuna, F., Civitillo, S., & Jugert, P. (2024). Culturally responsive teaching, teacher-student relationship and school belongingness: A multi-informant study in ethnically diverse classrooms. *Learning, Culture and Social Interaction*, 47, Article 100839. DOI: <https://doi.org/10.1016/j.lcsi.2024.100839>
- Ibrahim, N., Safitri, D., Marini, A., Pratama, I., & Marfu, A. (2026). Education sustainability through interactive modules and learning autonomy to improve self directed learning among middle school students with PLS SEM random forest and XGBoost. *Discover Sustainability*, 7, Article 166. DOI: <https://doi.org/10.1007/s43621-025-02508-8>
- Iskandar, S. L., & Fathurrahman, M. (2025). Lift the flap book INDORIA assisted by edugames to improve fourth-grade learning outcomes. *Jurnal Prima Edukasia*, 13(3), 427–438. DOI: <https://doi.org/10.21831/jpe.v13i3.85369>
- Julianti, D., Yurdayanti, & Arrosyad, M. I. (2024). Development of pop-up book learning media on Indonesian cultural diversity in IPAS lessons for 4th grade elementary school students. *JBES (Jurnal Basic Education Skills)*, 2(3), 246–256. DOI: <https://doi.org/10.35438/jbes.v2i3.91>
- Kamal, A. L., Ali, M. K., Safitri, D., & Sujarwo. (2024). The use of pop-up book media in social studies learning to improve student learning outcomes. *Jurnal Teknologi Pendidikan*, 1(3), 1–12. DOI: <https://doi.org/10.47134/jtp.v1i3.336>
- Kerimbayev, N., Adamova, K., Shadiev, R., & Altinay, Z. (2025). Intelligent educational technologies in individual learning: A systematic literature review. *Smart Learning Environments*, 14(1), 1–30. DOI: <https://doi.org/10.1186/s40561-024-00360-3>
- Kholilah, N. K., & Aeni, K. (2025). Analysis of MANTAB habituation in strengthening the profile of Pancasila students of elementary school students. *Jurnal Prima Edukasia*, 13(3), 440–452. DOI: <https://doi.org/10.21831/jpe.v13i3.84863>
- Koç, A., & Kanadlı, S. (2025). Effect of interactive learning environments on learning outcomes in science education: A network meta-analysis. *Journal of Science Education and Technology*, 34, 681–703. DOI: <https://doi.org/10.1007/s10956-025-10202-7>

- Kusumawardani, S., & Andaryani, E. T. (2025). Development of a guidebook for writing free poetry using the inductive model of illustrated words for 5th grade elementary school. *JlIP (Jurnal Ilmiah Ilmu Pendidikan)*, 8(7), 8379–8388. DOI: <https://doi.org/10.54371/jiip.v8i7.8762>
- Lestari, K. E., & Yudhanegara, M. R. (2017). *Mathematics education research*. PT Refika Aditama.
- Mansour, N., Aras, C., Kleine, J., & Sarah, S. (2025). Embodied learning of science concepts through augmented reality technology. *Education and Information Technologies*, 30(6), 8245–8275. DOI: <https://doi.org/10.1007/s10639-024-13120-0>
- Masruroh, Z. S., Mintohari, M., & Anam, C. (2024). The use of pop-up books as a learning medium to enhance cultural heritage understanding among fifth grade elementary school students. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 9(2), 1215–1226. DOI: <https://doi.org/10.23969/jp.v9i2.14007>
- Nindhita, L., Andaryani, E., Astuti, T., & Yulianto, S. (2023). The effectiveness of the project-based learning model on the motivation and learning outcomes of dance arts in first grade students at Tunas Hidup Harapan Kita Elementary School, Tegal City. *Jurnal Binagogik*, 10(1), 77–88. DOI: <https://doi.org/10.61290/pgsd.v10i1.14>
- Priyanti, D., Sebayang, G. A. B., & Nanda, F. A. (2025). Powtoon pop up book digital to improve Ppkn learning outcomes for 5th grade students at UPT SD Negeri 101740 Tanjung Selamat. *Jurnal Binagogik*, 12(2), 167–186. <https://ejournal.uncm.ac.id/index.php/pgsd/article/view/1727>
- Putri, F. I. S., & Adam, K. M. T. (2022). Implementation of Pancasila values in building the character of the Indonesian nation. *Jurnal Global Citizen: Jurnal Ilmiah Kajian Pendidikan Kewarganegaraan*, 12(1), 6–16. DOI: <https://doi.org/10.33061/jgz.v12i1.7416>
- Rachmawati, A. (2025). Innovative digital learning media to enhance student engagement and learning outcomes in elementary schools. *Schola Journal*, 3(1), 22–27. DOI: <https://doi.org/10.26877/schola.v3i1.2328>
- Rahman, D. A., & Andaryani, E. T. (2024). The influence of learning motivation on IPAS learning outcomes in grade V at SD Negeri Gayamsari 02, Semarang City. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 9(4), 467–474. DOI: <https://doi.org/10.23969/jp.v9i4.16965>
- Rahmawati, N., & Andaryani, E. T. (2025). Development of Canva-based flipbook learning media in improving Pancasila education learning outcomes for 4th grade students at SD Negeri Cabean 2 Demak. *Autentik: Jurnal Pengembangan Pendidikan Dasar*, 9(2), 278–289. DOI: <https://doi.org/10.36379/autentik.v9i2.693>
- Rakha, A. H. (2025). Cooperative learning with QR codes technology: Enhancing cognitive achievement and attitudes among students. *Frontiers in Education*, 10, 1–17. DOI: <https://doi.org/10.3389/educ.2025.1655913>
- Rizqi, F. N. N M., Supriyanto, T., Astuti, T., Ratnaningrum, I., & Andaryani, E. T. (2023). The influence of the implementation of the merdeka curriculum and learning motivation on the science learning outcomes of fourth grade elementary school students in the Pangeran Diponegoro Cluster, Pagerbarang District, Tegal Regency. *Journal of Elementary Education*, 5(2), 111–121. DOI: <https://doi.org/10.52690/jswse.v6i3.1285>
- Rofidah, N. F., Wulansari, B. Y., & Cahyono, H. (2022). Strengthening Pancasila values at Aisyiyah Keniten Kindergarten. *EDUPEDIA*, 6(2), 105–118. DOI: <https://doi.org/10.24269/ed.v6i2.1474>
- Salimi, M., Lintang, N. S., Hidayah, R., & Zainnuri, H. (2024). The implementation of Student Teams' Achievement Divisions applying multimedia to improve learning outcomes for fifth grade students at elementary school. *Jurnal Prima Edukasia*, 12(2), 204–215. DOI: <https://doi.org/10.21831/jpe.v12i2.68448>

- Stanič, K., & Špernjak, A. (2025). Augmented reality in biology education: A literature review. *Multimodal Technologies and Interaction*, 9(12), 1–16. DOI: <https://doi.org/10.3390/mti9120117>
- Sugiyono. (2021). *Metode penelitian pendidikan (kuantitatif, kualitatif, kombinasi, R&D dan penelitian pendidikan)* (A. Nuryanto, Ed.). Alfabeta.
- Wulandari, O., Pujiati, P., & Subakti, A. (2021). Development student worksheets-based question, read, reflect, recite, review (PQ4R) to improve creative thinking skills. *Jurnal Prima Edukasia*, 9(2), 213–222. DOI: <https://doi.org/10.21831/jpe.v9i2.36726>
- Wulansari, D., & Tyas, D. N. (2025). The development of interactive picture card media with QR code to improve IPAS learning outcomes. *Jurnal Prima Edukasia*, 13(2), 213–224. DOI: <https://doi.org/10.21831/jpe.v13i2.84474>
- Zeng, Y., Isleem, H. F., Tejani, G. G., Jahami, A., & Alnowibet, K. A. (2025). Examining the impact of culturally responsive teaching and identity affirmation on student outcomes: A mixed-methods study in diverse educational settings. *International Journal of Educational Development*, 117, Article 103376. DOI: <https://doi.org/10.1016/j.ijedudev.2025.103376>
- Zhi, F., Li, C., Chen, A., Chieh, C., Ching, T., Pai, H., En, K., En, T., Liang, C., & Fan, Y. (2025). Enhancing student engagement and learning outcomes in life sciences: Implementing interactive learning environments and flipped classroom models. *Discover Education*, 4, Article 102. DOI: <https://doi.org/10.1007/s44217-025-00501-x>
- Zhou, T., & Colomer, J. (2024). Cooperative learning promoting cultural diversity and individual accountability: A systematic review. *Education Sciences*, 14(6), 1–15. DOI: <https://doi.org/10.3390/educsci14060567>