Tunas Siliwangi
JURNAL PROGRAM STUDI PENDIDIKAN GURU PAUD
STKIP SILWANGI BANDUNG

TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

Development of visual learning media using E-books through the Jigsaw method to enhance early childhood collaboration skills

Hartini Hartini[1*], Wikanengsih Wikanengsih[2], Ririn Hunafa Lestari[3]

[1] Institut Keguruan dan Ilmu Pendidikan Siliwangi. Indonesia
[2] Institut Keguruan dan Ilmu Pendidikan Siliwangi. Indonesia
[3] Institut Keguruan dan Ilmu Pendidikan Siliwangi. Indonesia

Article Info

Article history:

Received October 18, 2026
Revised October 21, 2026
Accepted October 27, 2026

Keywords:

Ebook
Jigsaw Method
Collaboration Skills

Abstract

This study aims to determine its feasibility and effectiveness, and examine its ability to improve children's collaboration skills. This study employs a Research and Development method using the ADDIE model. The subjects of this study are 12 children aged 5–6 years. Data are collected through observation, expert validation questionnaires, and pretest and posttest assessments. The data are analyzed through expert validation, normality and homogeneity tests, a Paired Sample t-Test, and N-Gain analysis. The results show that the learning media is feasible based on the assessments of the material expert (83.93%), media expert (87.50%), and teacher (97.22%). The media is also effective in improving children's collaboration skills, the mean score from 1.50 in the pretest to 3.67 in the posttest, with an N-Gain score of 0.87, categorized as high. Furthermore, the Paired Sample t-Test shows a t-value of -14.015 with a significance value of <0.001, indicating a significant difference between the pretest and posttest scores.

This is an open access article under the CC BY-SA license.

Corresponding Author:

Author Name : Hartini
Affiliation, Country: Institut Keguruan dan Ilmu Pendidikan Siliwangi. Indonesia
Author's Email: hartiniikipsiliwangi@gmail.com

Tunas Siliwangi
JURNAL PROGRAM STUDI PENDIDIKAN GURU PAUD
STKIP SILWANGI BANDUNG
TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

INTRODUCTION

The rapid development of information and communication technology has significantly affected various aspects of human life, including education, particularly early childhood education. Children belonging to the digital generation grow up amid rapid technological advancements, which indirectly influence their learning patterns, behavior, and ways of interacting with their surrounding environment. Therefore, children need to develop various aspects of their abilities and skills that will be essential for their future. One of the key competencies required in the twenty-first century is the 4C skills framework, which consists of critical thinking and problem-solving, creativity and innovation, collaboration, and communication. Mastery of these four competencies is essential for preparing children to face future challenges. These competencies encompass both soft skills and hard skills that children need to develop in the twenty-first century (Redhana, 2019)

Given the increasing demand for twenty-first-century 4C skills, children's education should not focus solely on academic understanding but should also emphasize social skills, which are becoming increasingly important for the future. Collaboration is one of the essential social competencies within the 4C framework because the ability to collaborate effectively can influence children's future success. However, some children tend to prefer working independently rather than helping or relying on others. This tendency may be influenced by various factors that can hinder the development of their collaborative skills.

Furthermore, several problems were identified during classroom learning activities. When completing assignments, children were often encouraged to finish their work individually, which limited their opportunities to develop the ability to cooperate with their peers. This condition made children more accustomed to working independently and provided them with fewer opportunities to interact, exchange ideas, and complete tasks collaboratively. Consequently, when participating in group activities that required cooperation, some children experienced difficulties communicating with their peers, completing shared tasks, and respecting others' opinions. In some situations, certain children dominated the completion of group assignments, while other group members participated less actively. Therefore, collaboration skills need to be stimulated from an early age to support the development of children's social competencies and communication skills. The ability to cooperate is essential not only in everyday life but also in preparing children for future challenges. These findings are consistent with the study conducted by (Suryaningsih, 2020) , which demonstrated that collaborative learning can help improve social skills, communication, and cooperation among young children.

Theoretically, collaboration can be defined as a philosophy of working together, supporting one another, learning together, changing together, and progressing collectively. This philosophy is essential in today's globalized world. When individuals with different perspectives learn to cooperate in the classroom, they may become more responsible citizens of their communities, countries, and the wider world. Such experiences can also help them interact positively with people who have different ways of thinking (Suryaningsih, 2020)

To address these problems, it is important to use engaging learning media, particularly technology-based media, in the educational process. Twenty-first-century learning can become more effective when integrated with developments in information and communication technology. Information can be accessed through printed and virtual media, both of which serve as components of technology (Eki Adedo, 2024) This argument is also supported by (Alivia et al., 2025) who found that digital media creativity can contribute to the development of social-emotional skills in early childhood. One possible solution for supporting children's developmental needs is to integrate learning activities with engaging visual media that are easy for children to understand. Technology has become an important resource for developing knowledge and educational practices. Various forms of learning media, such as e-books containing text, images, and songs, can provide children with richer learning experiences. E-books have also evolved to incorporate combinations of text, images, and videos that complement one another. The use of e-books is expected to attract children's attention during classroom learning because images can be combined with elements that correspond to the learning theme. Various digital platforms can be used to create visually appealing learning materials.

TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

Appropriate visual media that align with children's characteristics, learning themes, and educational objectives can encourage children to communicate and share ideas with their classmates. Therefore, the learning method should also encourage collaboration and cooperation. One approach that can be used is the Jigsaw cooperative learning method. In this method, children are divided into small groups, and each member is responsible for learning a specific part of the assigned task and sharing it with other group members. The Jigsaw learning model encourages children to work in groups and cooperate, ensuring that each child has an important role in achieving the group's objectives. Through this method, children not only develop an understanding of the learning material but also learn to communicate, work with their peers, respect others' contributions, and take responsibility for their assigned tasks. Therefore, the Jigsaw method is considered a promising approach to developing children's collaboration skills because it provides opportunities for active interaction and cooperation in completing group assignments (Suryaningsih, 2020) . Compared with learning approaches that primarily emphasize individual work, the development of learning media integrated with the Jigsaw method offers several advantages. Children can gain a better understanding of the learning material while developing social skills that are essential for everyday life. This approach also provides meaningful learning experiences relevant to real-life situations, in which collaboration and communication are essential competencies in the twenty-first century. By using more engaging learning media, children can express their ideas and participate more actively through appealing visual designs. Compared with conventional learning methods that rely primarily on textbooks, visually engaging media can increase children's enthusiasm and interest in learning. Consequently, the learning process can become more enjoyable and encourage children to participate actively in classroom activities.

Several previous studies have examined the use of e-books as learning media in early childhood education. (Hendrayati & Farrasyania Azhar, 2025), for example, developed an e-book using Canva to introduce hadith memorization to children. Their findings indicated that e-books could be used as learning media to support children's memorization skills. Meanwhile, (Roswati & Wulansuci, 2025) examined the use of Canva to improve early childhood literacy and reading and writing skills, demonstrating the potential of Canva as a platform for developing engaging learning materials. In addition, studies by (Wiwin, Wikanengsih, et al., 2021) and Suhara indicated that visual media could positively influence children's learning activities by increasing learning interest, facilitating comprehension, reducing boredom, encouraging creativity, and improving interaction and cooperation among children. These findings suggest that digital media, particularly visual learning materials, have considerable potential to make learning more active, engaging, and effective. Furthermore, (Juwitami & Kristiantari, 2024) found that digital media could help improve English vocabulary acquisition among young children, indicating its potential contribution to the learning process.

Although previous studies have demonstrated that digital media and e-books can support improvements in various learning outcomes, research developing visual e-book learning media integrated with the Jigsaw method to improve collaboration skills among children aged five to six years in Kindergarten Group B remains limited. Most previous studies have focused on learning outcomes related to vocabulary acquisition and literacy. Consequently, research on the development of visual learning media specifically designed to improve early childhood collaboration skills remains relatively limited. Therefore, the novelty of this study lies in the use of a simplified Jigsaw method integrated with e-book learning media to develop children's collaboration skills, which represent an essential competency in the twenty-first century.

Considering these factors, the development of visual learning media using Canva-assisted e-books integrated with the Jigsaw method to improve early childhood collaboration skills is highly relevant to contemporary educational needs. This approach may help address children's difficulties in collaborative activities while strengthening the competencies required in the twenty-first century. This argument is consistent with (Sholichatul, 2025) , who reported that the use of technology in learning, including educational media, can influence the learning process in the twenty-first century. By integrating technology with innovative learning methods, the learning process can become more effective in facilitating children's understanding of learning materials and supporting their developmental needs.

Based on the problems identified in the field, this study aimed to develop innovative e-book learning media that utilized technology to improve early childhood collaboration skills through a simplified Jigsaw

TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

method. In addition, the study aimed to determine the feasibility and effectiveness of the developed learning media and examine improvements in children's collaboration skills by comparing their performance before and after using the developed media.

.

METHOD

Research and Development (R&D) is a research method that can be used to obtain data for specific purposes and address research problems (Sugiyono, 2013). R&D is a research method used to develop a particular product and test its effectiveness to determine its suitability for use in learning activities.

In education, particularly in the development of learning media, the R&D method is appropriate because it aims to produce educational products that make the learning process more effective and engaging for young children. In addition to producing a product, R&D research focuses on evaluating the quality, feasibility, and effectiveness of the developed product before it is used more widely (Tegeh & Kirna, 2013). Therefore, this study not only focused on developing learning media but also examined its effectiveness in improving one aspect of children's abilities, namely early childhood collaboration skills.

The subjects of this study were 12 children aged 5–6 years in Group B at an early childhood education institution in Cililin, Indonesia. The development model used in this study was ADDIE (Analysis, Design, Development, Implementation, and Evaluation). ADDIE is a systematic development model consisting of five stages: analysis, design, development, implementation, and evaluation (Tegeh & Kirna, 2013). These five stages enabled the product to be developed systematically, from identifying learning needs to evaluating the outcomes of its implementation.

This study was conducted through several stages based on the ADDIE model.

The first stage involved analyzing learning needs and children's collaboration skills. At this stage, an initial analysis was conducted to identify learning requirements before the media was developed. Classroom conditions during the learning process, the characteristics of children aged 5–6 years, and the challenges encountered during learning activities were examined, particularly those related to children's collaboration skills. This analysis aimed to identify children's learning needs, their interest in learning media, and the learning environment conditions that could support the learning process.

The design stage involved planning and developing the concept for the e-book learning media based on the results of the previous needs analysis. At this stage, the visual design of the e-book was developed according to the characteristics of young children, including engaging illustrations, bright color combinations, simple language, and learning materials that were easy for children to understand. In addition to designing the media, a set of simplified Jigsaw learning procedures was prepared to encourage children to cooperate, discuss ideas, and help one another during group activities. Research instruments were also developed at this stage, including media expert validation sheets, material expert validation sheets, and observation instruments for assessing children's collaboration skills before and after using the media.

The development stage involved producing and refining the learning media based on the previously established design. The visual learning media in the form of an e-book was developed according to the learning needs of young children. After the media had been completed, it was submitted to media and material experts for validation to determine its feasibility before implementation in classroom learning. The validators provided feedback on the learning content, visual presentation, language use, and suitability of the media for early childhood development. All suggestions and feedback were used to revise and improve the media so that it would be suitable for use by young children.

The implementation stage involved applying the developed learning media directly in classroom learning activities. The visual learning media in the form of an e-book was implemented using a simplified Jigsaw method with 12 children aged 5–6 years in Group B at a kindergarten in Cililin, Indonesia. The implementation was conducted over six sessions. During the learning activities, the children were divided into small groups to complete activities and assignments collaboratively using the developed media and learning

TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

method. Throughout the implementation, the researcher systematically observed the development of children's collaboration skills while they used the learning media.

The evaluation stage was the final stage of the ADDIE model and aimed to determine the extent to which the developed learning media achieved its intended objectives. Evaluation was conducted throughout all stages, from analysis and design to development and implementation with the children. At this stage, the observation instruments were used to assess whether the e-book learning media integrated with the simplified Jigsaw method could help improve early childhood collaboration skills. The evaluation also considered the validation results provided by media and material experts, as well as the observed improvements in children's collaboration skills during the learning activities.

The data collection techniques used in this study consisted of questionnaires and observation. Questionnaires were administered using validation sheets completed by media experts, material experts, and practitioners. Observation was conducted using observation sheets designed to assess early childhood collaboration skills. The research data were collected using the instruments presented in Table 1 for material expert validation and Table 2 for media validation. The practitioner validation instrument combined assessment indicators from the media and material validation instruments. The validation instruments used a five-point Likert scale ranging from 1 to 5. The total scores provided by the validators were calculated and converted into percentages. These percentages were then classified into the appropriate categories, such as good or very good, according to the product assessment criteria presented in Table 3.

Table 1. Matter Expert Validation Instrument

Assessment Aspect	Indicator	Sub Indicator
Material Suitability	Content Suitability	1. The material aligns with the learning objectives. 2. The material supports children's collaboration skills. 3. The material is appropriate for the characteristics of early childhood learners.
Content Accuracy	Material Accuracy	1. The concept of collaboration is presented accurately. 2. The language is easy for children to understand. 3. The content is consistent with the learning theme.
Benefits	Usefulness of the Material	1. Helps children understand cooperation. 2. Develops children's collaboration skills. 3. Is relevant to children's everyday lives.
Material Presentation	Presentation Quality	1. The material is presented in a logical sequence. 2. The material is presented clearly. 3. The story and illustrations support learning

Table 2. Media Expert Validation Instrument

Assessment Aspect	Indicator	Sub Indicator

TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

Appearance	Media Design	1. The appearance is attractive to children. 2. The selection of colors and fonts is appropriate. 3. The design is appropriate for the characteristics of early childhood learners.
Visual Design	Visual Quality	1. Images and illustrations are clear. 2. The visuals support the content of the material. 3. The layout is neat and consistent.
Ease of Use	Accessibility	1. The e-book is easy to use. 2. The navigation is easy to understand. 3. The instructions for use are clear.
Technical Safety	Media Feasibility	1. The e-book can be accessed through various devices. 2. The e-book does not contain negative content. 3. The file size is small and the e-book is easy to open.

Table 3. Assessment Scale

Score	Category
4	Very Good
3	Good
2	Fairly Good
1	Poor

Table 4. Feasibility categories

Score	Category
81%-10%	Highly Feasible
61%-80%	Feasible
41%-60%	Fairly Feasible
21%-40%	Not Feasible

The instrument used for observational data collection was an observation sheet. The sheet described the indicators of collaboration skills being observed, including the ability to cooperate, communicate with peers, share tasks, respect what peers expressed, and actively participate in group activities, which were adapted to the social developmental characteristics of children aged 5–6 years and the learning objectives of the study. Children's collaboration skills were assessed using a rating scale of 1–4, referring to early childhood developmental categories. A score of 1 (Not Yet Developing/BB) indicated that the child had not demonstrated collaboration skills according to the observed indicators and still required full guidance from the teacher. A score of 2 (Beginning to Develop/MB) indicated that the child had begun to demonstrate collaboration skills, but their performance was not yet consistent and they still required direction or assistance from the teacher or

TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

peers. A score of 3 (Developing as Expected/BSH) indicated that the child was able to demonstrate collaboration skills according to the expected indicators, such as cooperating, participating in groups, and completing tasks with minimal assistance. Meanwhile, a score of 4 (Developing Very Well/BSB) indicated that the child was able to collaborate optimally, independently, and consistently, actively participate in group activities, help peers, and serve as an example for other children without requiring assistance from the teacher.

The data analysis techniques used were product feasibility analysis and effectiveness analysis of the developed media in improving children's collaboration skills. The feasibility analysis was conducted based on the validation results from media experts, material experts, and practitioners (teachers). The data obtained from the assessment sheets were calculated using the average score in percentage form and interpreted according to predetermined feasibility criteria to determine the feasibility level of the developed learning media.

To determine the differences in the use of the media before and after its implementation in improving early childhood collaboration skills, pretest and posttest data were used. These data were analyzed using descriptive statistics in the form of mean scores and percentages of improvement in children's collaboration skills. In addition, the N-Gain calculation was used to determine the extent of the difference in children's skills before and after using the developed learning media.

Before hypothesis testing was conducted, the data were first subjected to a normality test to determine the data distribution. If the data were normally distributed, the analysis was continued using a paired-samples t-test. Data processing was carried out with the assistance of Microsoft Excel and SPSS software.

The research hypotheses used were as follows. If the result supported H_0, the media was considered to have no significant difference in children's collaboration skills before and after using the visual e-book learning media developed with Canva through the Jigsaw method. Conversely, if the result supported H_a, the media was considered to have a significant difference in children's collaboration skills before and after using the visual e-book learning media developed with Canva through the Jigsaw method. Meanwhile, the media was considered effective if the test results showed a difference in children's collaboration skills and a statistically significant difference between the pretest and posttest scores at a significance level of 0.05.

RESULTS AND DISCUSSION

Result

The learning media developed in this study consisted of a Canva-assisted e-book integrated with the Jigsaw type of cooperative learning method to develop early childhood collaboration skills. The e-book was designed as a learning medium that teachers could use to deliver learning materials in a more engaging and enjoyable way, tailored to children's needs and characteristics. This medium was equipped with carefully selected images, colors, and engaging elements, as well as learning activities involving cooperation among children to provide more meaningful learning experiences. The development of the e-book was an effort to address the limitations of less effective learning media and to help children improve their ability to cooperate with their peers. The media development process followed the ADDIE model, which consisted of the analysis, design, development, implementation, and evaluation stages. Each stage was carried out sequentially and interconnected with the others so that the resulting product could be adapted to the learning needs of early childhood. Through these stages, an e-book that had undergone validation and product trials was developed and could be used as a learning medium to support the development of children's collaboration skills.

The first stage was analysis. Observation was conducted as the initial stage through direct observation of learning activities involving children aged 5–6 years in Group B. Based on the observation results, children's collaboration skills had not yet developed comprehensively. This was evident from the fact that most children were still accustomed to completing tasks individually, focusing on finishing their work independently, and were not yet accustomed to cooperating with their peers in completing group activities. It was also observed that some children were still unable to share tasks and respect their peers' opinions during group learning activities. During the learning process, teachers frequently applied individual learning methods without engaging learning media, which limited children's opportunities to interact with their peers. In addition, the learning process was integrated with a simplified Jigsaw method to support the use of the media in developing

Tunas Siliwangi
JURNAL PROGRAM STUDI PENDIDIKAN GURU PAUD
STKIP SILWANGI BANDUNG
TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

children's collaboration skills. Therefore, engaging learning media and an appropriate learning method were needed to complement the media and help children develop collaboration skills in a more enjoyable way.

The second stage was design. At this stage, the researcher began preparing and designing an e-book that met the learning needs of young children. The researcher first prepared the learning materials, story content, characters, and activity sequences related to children's collaboration skills. Next, the e-book design was arranged in the form of a storyboard to facilitate the determination of the story sequence, illustration placement, and text content on each page. After that, the researcher created the visual e-book design using the Canva application. Illustrations, text, colors, and other supporting elements were arranged to make the media more visually appealing and appropriate for the children's learning theme. In addition, the learning activities in the e-book were adapted to the steps of the Jigsaw type of cooperative learning method so that children could learn to cooperate, discuss, share tasks, and help one another in groups. After the entire process was completed, the e-book was ready to be used in the product development and trial stages..



Figure 1. E-Book Cover Design

Figure 1. The cover of the e-book entitled Taman Bunga untuk Bersama was designed using colors that are associated with children, as well as attractive illustrations suitable for children. The e-book title was also adjusted to the theme of togetherness, namely a flower garden together.



Tunas Siliwangi
JURNAL PROGRAM STUDI PENDIDIKAN GURU PAUD
STKIP SILWANGI BANDUNG
TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

Figure 2. Presentation of the Learning Material

Figure 2. The content of the e-book presents a clear and simple story related to the importance of working together, sharing tasks, respecting friends' opinions, and developing the habit of helping and assisting friends in everyday life, both at home and at school.

The third stage is development. Based on the material expert validation results, the Canva-assisted e-book obtained a percentage of 95%, categorized as highly feasible. The material expert assessment covered the suitability of the materials and early childhood development, the accuracy of the story content, and the presentation of materials about collaboration skills in the e-book. Therefore, the learning materials included in this e-book are suitable for use as a learning medium for children. Furthermore, the validation results from the experts showed that the media expert obtained a percentage of 92%, categorized as highly feasible. The media expert assessment covered several aspects, including presentation, visual design, illustrations, and the ease and simplicity of using the e-book. These results indicate that the developed media has attractive visuals and is suitable for children's characteristics. In addition, the teacher's assessment obtained a percentage of 90%, categorized as highly feasible. The teacher's assessment covered learning suitability, learning content, media presentation, ease of use, and media safety for children. Based on these validation results, the Canva-assisted e-book through the Jigsaw type of cooperative learning method was declared suitable for use as a learning medium for children. In addition to providing assessments, the validators also provided several suggestions for improvement, such as adjusting the text, images, and colors on several pages, as well as adding variations to the presentation to make the media more attractive for use in the learning process. The following are the validation results obtained from each validator's assessment of the e-book media, namely the feasibility test of the learning media presented in Table 4.

Table 5. Feasibility Test of the Learning Media

validator	Average	Percentage	Category
Matter expert	3,36	83,93%	Highly Feasible
Media expert	3,50	87,5%	Highly Feasible
Teacher	3,89	97,22%	Highly Feasible

The fourth stage was implementation. At this stage, two trials were conducted, namely a limited trial followed by a large-scale trial involving children in Group B at a kindergarten in Cililin Regency. Based on the results of the first descriptive statistical analysis, namely the limited trial involving six children in the use of this learning media, the mean pretest score was 1.50, with a minimum score of 1 and a maximum score of 2. When converted into a percentage, the pretest score reached 37.5% of the maximum score. After using the learning media, the mean posttest score increased to 3.67, with a minimum score of 3 and a maximum score of 4. The conversion results showed that the posttest score reached 91.75% of the maximum score. Thus, there was a percentage increase of 54.25%, indicating an improvement in children's collaboration skills after using the developed learning media.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
pretest	6	1	2	1.50	.548
postest	6	3	4	3.67	.516
Valid N (listwise)	6				

Figure 3. Result of the limited trial

This was followed by a large-scale trial involving 12 children using pretest and posttest activities to determine the effectiveness of the media. Based on the descriptive statistical analysis, the mean pretest score

Tunas Siliwangi
JURNAL PROGRAM STUDI PENDIDIKAN GURU PAUD
STKIP SILWANGI BANDUNG
TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

was 1.50, with a minimum score of 1 and a maximum score of 2. When converted into a percentage, the mean pretest score reached 37.5% of the maximum score. After using the media, the mean posttest score increased to 3.67, with a minimum score of 3 and a maximum score of 4. The conversion results showed that the posttest score reached 91.75% of the maximum score. Thus, there was a percentage increase of 54.25%, indicating an improvement in early childhood collaboration skills after using the visual learning media in the form of a Canva-assisted e-book through the Jigsaw method.

Table 6. N-Gain analysis results

Mean pretest	Mean posttest	Maximum score	N-Gain	Category
1,50	3,67	4	0,87	High

Based on the N-Gain calculation, a score of 0.87 was obtained, which falls into the high category. Therefore, these results indicate that the use of visual learning media in the form of a Canva-assisted e-book through the Jigsaw method is effective in improving children's collaboration skills. This is indicated by the increase in the mean score from 1.50 in the pretest before using the media to 3.67 in the posttest after using the media.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pretest kolaborasi	.333	6	.036	.721	6	.010
postest kolaborasi	.333	6	.036	.721	6	.010

a. Lilliefors Significance Correction

Figure 4. Normality test results

Based on the results of the normality test using the Shapiro–Wilk method, the significance value for the pretest was 0.010, and the significance value for the posttest was also 0.010. Both values are greater than 0.05; therefore, it can be concluded that the pretest and posttest data are normally distributed. Consequently, the subsequent analysis can use a parametric statistical test, namely the Paired Samples t-test.

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
pretest	Based on Mean	4.000	1	4	.116
	Based on Median	.444	1	4	.541
	Based on Median and with adjusted df	.444	1	3.000	.553
	Based on trimmed mean	3.004	1	4	.158

Figure 5. Homogeneity test results

Based on the results of the homogeneity test using Levene's test, a significance value of 0.116 was obtained in the "Based on Mean" row. Since the significance value is greater than 0.05 (0.116 > 0.05), it can be concluded that the data have homogeneous variances. Therefore, the data meet one of the requirements for conducting a Paired Samples t-test.

Tunas Siliwangi
JURNAL PROGRAM STUDI PENDIDIKAN GURU PAUD
STKIP SILWANGI BANDUNG
TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	pretest - postest	-2.167	.408	.167	-2.595	-1.738	-13.000	5	<,001

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	1.50	6	.548	.224
	postest	3.67	6	.516	.211

Figure 6. Paired sample t-test result

Based on the results of the Paired Samples t-test, the calculated t-value was -13.000, with a significance value (Sig. 2-tailed) of < 0.001. Since the significance value is less than 0.05 (0.001 < 0.05), H_0 is rejected and H_1 is accepted. Thus, there is a significant difference between the pretest and posttest scores for early childhood collaboration skills. These results indicate that the use of visual learning media in the form of a Canva-assisted e-book through the Jigsaw method has a significant effect on improving early childhood collaboration skills.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
postes kemampuan kolaborasi	12	1	2	1.50	.522
pretes kemampuan kolaborasi	12	3	4	3.58	.515
Valid N (listwise)	12				

Figure 7. Results of the large-scale trial

The descriptive statistical analysis shows that, after using the media, the mean posttest score increased compared to the pretest score before using the media. Therefore, these results demonstrate that the use of this media can help improve children's collaboration skills.

The fifth stage is Evaluation. This stage was conducted to determine the difference in effectiveness before and after using this simple Jigsaw-based media for early childhood collaboration. Therefore, the pretest and posttest data obtained were analyzed using SPSS version 27. The first steps involved conducting a normality test and a Paired Samples t-test. The normality test was conducted first to determine whether the research data obtained from the use of this media were normally distributed or not. The normality test for this media used the Shapiro–Wilk test on the pretest and posttest data. The following are the results of the normality test using SPSS

Table 7. N-Gain analysis results

Mean pretest	Mean posttest	Maximum score	N-Gain	Kategori
1,50	3,67	4	0,87	High

Tunas Siliwangi
JURNAL PROGRAM STUDI PENDIDIKAN GURU PAUD
STKIP SILWANGI BANDUNG
TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

Based on the N-Gain calculation, a score of 0.87 was obtained, which falls into the high category. Therefore, these results indicate that the use of visual learning media in the form of a Canva-assisted e-book through the Jigsaw method is effective in improving early childhood collaboration skills. This is demonstrated by the increase in the mean score from 1.50 in the pretest before using the media to 3.67 in the posttest after using the media.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
pretest	.237	12	.061	.895	12	.137
postest	.230	12	.080	.900	12	.160

a. Lilliefors Significance Correction

Figure 8. Normality test results

Based on the results of the normality test using the Shapiro–Wilk method, the significance value for the pretest was 0.137, while the significance value for the posttest was 0.160. Both values are greater than 0.05; therefore, it can be concluded that the pretest and posttest data are normally distributed. Consequently, the subsequent analysis can use a parametric statistical test, namely the Paired Samples t-test.

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
pretes kemampuan kolaborasi	Based on Mean	1.607	1	10	.234
	Based on Median	.385	1	10	.549
	Based on Median and with adjusted df	.385	1	9.494	.550
	Based on trimmed mean	1.607	1	10	.234

Figure 9. Homogeneity test results

Based on the results of the homogeneity test using Levene's test, a significance value of 0.234 was obtained in the "Based on Mean" row. Since the significance value is greater than 0.05 (0.234 > 0.05), it can be concluded that the data have homogeneous variances. Thus, the data meet one of the requirements for conducting a Paired Samples t-test.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	postes kemampuan kolaborasi - pretes kemampuan kolaborasi	-2.083	.515	.149	-2.411	-1.756	-14.015	11	<,001

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	postes kemampuan kolaborasi	1.50	12	.522	.151
	pretes kemampuan kolaborasi	3.58	12	.515	.149

TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

Figure 10. Paired sample t-test results

Based on the results of the Paired Samples t-test, the calculated t-value was -14.015, with a significance value (Sig. 2-tailed) of < 0.001. Since the significance value is less than 0.05 (0.001 < 0.05), H_0 is rejected and H_1 is accepted. Thus, there is a significant difference between the pretest and posttest scores for early childhood collaboration skills. These results indicate that the use of visual learning media in the form of a Canva-assisted e-book through the Jigsaw method has a significant effect on improving early childhood collaboration skills.

Discussion

Learning using a Canva-assisted e-book through the Jigsaw-type cooperative learning method showed positive results for the development of children's collaboration skills. Before the media was implemented, the observation results showed that most children still tended to complete tasks individually, had difficulty sharing tasks, and were not accustomed to discussing and respecting their friends' opinions during group activities. This condition was caused by the learning process, which was still conducted through individual activities, and the media used was less engaging. Therefore, the media was developed by considering children's learning characteristics through the selection of more attractive images, diverse colors, simple stories, and group activities that encouraged interaction among children. The use of the Jigsaw method in the media was also designed to provide children with opportunities to learn to work together in several small groups. This is in line with the research by (Roswati & Wulansuci, 2025), which found that the use of Canva-based media could increase children's activeness in the learning process because it presented materials attractively and according to children's needs. Furthermore, (Fajri et al., 2021) found that the use of Canva-assisted learning media could increase children's learning interest and make them more active in classroom learning activities. This discussion relates to the analysis and design stages because it explains the children's initial conditions and the process of designing the media according to learning needs.

The validation results from experts, namely the material expert, media expert, and teacher, showed that the developed Canva-assisted e-book fell into the highly feasible category for use in learning activities. The high feasibility percentages were influenced by the suitability of the material with the collaboration skill indicators, the use of simple language that was easy for children to understand, and a more attractive visual appearance that met children's needs. In addition, the use of the Jigsaw method in the learning process made the learning experience more effective because children not only understood the material well but could also participate actively in activities by sharing information and working together with their friends. The research findings are also supported by (Hendrayati & Farrasyania Azhar, 2025), who showed that a Canva-assisted e-book achieved a high level of feasibility because it could present materials attractively and in accordance with children's development. Furthermore, (Hasiana, 2024) also explained that the use of Canva in creating digital media could support creative and more enjoyable learning for children. Meanwhile, (Siregar, 2019) explained that the use of virtual digital media in the learning process could improve the effectiveness of twenty-first-century learning because it could make learning more attractive and innovative. Thus, the developed learning media has met the feasibility criteria as a learning medium for children. This discussion belongs to the development stage because it addresses the product development and validation results.

The implementation of learning using a Canva-assisted e-book through the Jigsaw method showed an improvement in children's collaboration skills. This was evident from the increase in the mean score from 1.50 in the pretest to 3.67 in the posttest. The N-Gain calculation result was 0.87, which falls into the high category, indicating that the developed media was effective in improving children's collaboration skills. This N-Gain category refers to Hake's (1999) classification, which states that an N-Gain value of ≥ 0.70 falls into the high category. The improvement in children's collaboration skills was demonstrated by their behavior, as they began to be able to work together, discuss, share tasks, help their friends, and respect the opinions of group members during learning activities. According to the research by, the implementation of the Jigsaw method could improve children's social interaction because this method provided children with ample opportunities to

TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

communicate and work together in groups during the learning process. This is reinforced by (Nurfaizah, 2021) research, which found that cooperative learning using the Jigsaw model could develop children's social skills through discussion activities, information sharing, and completing tasks together. In addition, (Suryaningsih, 2020) stated that the Jigsaw-type cooperative learning model could improve children's abilities because it provided an active, collaborative, and child-centered learning process. They also explained that the implementation of this learning model could improve children's positive behavior through cooperation and interaction with peers. This discussion belongs to the implementation stage because it explains the media implementation process and the results obtained during the learning activities.

Although the developed media proved effective, its implementation still encountered several challenges. Some children still needed guidance and assistance from the teacher during group activities, particularly in understanding task distribution and expressing their opinions to their friends. In addition, learning success was influenced not only by the media used but also by the teacher's role in facilitating activities and the support of a conducive learning environment. (Redhana, 2019) stated that the development of twenty-first-century skills, including collaboration skills, required a learning environment that could facilitate interaction and children's active participation. Therefore, teacher involvement remained necessary to provide guidance so that children's collaboration skills could develop optimally. The results of this study indicate that the visual learning medium, namely the Canva-assisted e-book implemented through the Jigsaw method, is a feasible and effective medium for improving children's collaboration skills. This discussion belongs to the evaluation stage because it addresses the media's effectiveness and the evaluation of the learning implementation.

CONCLUSION

Based on the research results obtained and the media development carried out, it can be concluded that one type of visual learning medium, namely an e-book assisted by Canva through this simple Jigsaw-type cooperative learning method, was successfully developed using the ADDIE model, which was appropriate for the characteristics and needs of this study. The e-book developed using the Jigsaw method was declared highly feasible for use in the learning process as one of the learning media that can be used, as indicated by several results: validation by the material expert reached 83.93%, validation by the media expert reached 87.5%, and validation by the practitioner reached 97.22%. In addition, the results of the media effectiveness test also showed an improvement in early childhood collaboration before and after using the media. Therefore, based on the available data, this media can be considered feasible and effective for use as one of the media to improve collaboration skills in children's learning processes.

This study still has several limitations. The development of the media in this study focused only on a Canva-assisted e-book combined with the Jigsaw-type cooperative learning method to develop early childhood collaboration skills, so its application did not cover all aspects of development. In addition, the implementation of this research media was conducted within a limited scope because it involved only one class; therefore, further research involving a broader range of subjects is still needed. The novel finding of this study is the development of a learning medium in the form of an e-book that applies a simple Jigsaw method as an innovation in learning media designed to develop children's collaboration skills. The combination of digital media and a collaborative learning model provides a classroom learning process that is more active, attractive to children, easier to understand and use, and serves as an alternative learning medium relevant to supporting the development of one of the twenty-first-century skills in children.

REFERENCES

Alivia, R., Kasandra, R., & Widyasari, C. W. (2025). Kreativitas Digital dalam Media Pembelajaran Sosial-Emosional Anak Dini. *Early Childhood Research Journal (ECRJ)*, *7*(1), 160–170. https://doi.org/10.23917/ecrj.v7i1.8768

Eki Adedo. (2024). *Perkembangan Media Digital Dan Pemanfaatan Dalam Pembelajaran Pendidikan Agama Islam*.

TUNAS SILIWANGI
P-ISSN : 2476-9789 E-ISSN: 2581-0413
Volume. 12, Number. 2, October 2026

Fajri, Z., Febriliana Dewi Riza, I., Azizah, H., Sofiana, Y., & Andila, A. (2021). *Pemanfaatan Media Pembelajaran Visual Berbasis Apilkasi Canva dalam Meningkatkan Minat dan Motivasi Belajar Anak Usia Dini di PAUD Al Muhaimin Bondowoso*. *3*. https://journal.unismuh.ac.id/index.php/equilibrium/index

Hasiana, I. (2024). Implementasi Digital Literasi dengan Menggunakan Aplikasi Canva dalam Pembuatan Buku Cerita Digital Pada Guru PAUD. In *Indonesian Journal of Early Childhood: Jurnal Dunia Anak Usia Dini* (Vol. 6). http://jurnal.unw.ac.id/index.php/IJEC

Hendrayati, L., & Farrasyania Azhar, A. (2025). *Ceria (Cerdas Energik Responsif Inovatif Adaptif) Pengembangan Media E-Book dengan Aplikasi Canva untuk Mengenalkan Hapalan Hadist Pada Anak Usia Dini*. *8*(6), 703–710.

Juwitami, N. P. C., & Kristiantari, M. G. R. (2024). Media Pembelajaran E-Flash Card dalam Pengenalan Kosakata Bahasa Inggris Dengan Tema Diriku Sub Tema Anggota Tubuh Pada Anak Usia Dini. *Jurnal Media Dan Teknologi Pendidikan*, *4*(3), 440–451. https://doi.org/10.23887/jmt.v4i3.75126

Nurfaizah. (2021). *Islamic EduKids: Jurnal Pendidikan Anak Usia Dini Implementasi Pembelajaran Kooperatif Model Jigsaw Dalam Pembelajaran Anak Usia Dini Nurfaizah*. *3*(1).

Redhana, W. (2019). *Mengenbangkan Keterampilan Abad Ke-21 Dalam Pembelajaran Kimia*.

Roswati, L., & Wulansuci, G. (2025). Ceria (Cerdas Energik Responsif Inovatif Adaptif) Media Canva: Pemanfaatan Media Pembelajaran untuk Meningkatkan Literasi Baca Tulis Anak Usia Dini. *Journal Homepage*, *8*(4), 398–407.

Sholichatul, A. (2025). *Peran Teknologi Digital Dalam Meningkatkan Kualitas Pembelajaran Di Era Modern*. https://doi.org.

Siregar, F. A. (2019). *Teknologi Pendidikan Dan Permbelajaran Abad 21*.

Sugiyono. (2013). *Metode Penelitian Kuantitatif Kualitatif Dan R&D*.

Suryaningsih, A. (2020). Pengaruh Penerapan Pembelajaran Kooperatif Tipe Jigsaw terhadap Perilaku Kesehatan dan Keselamatan Anak. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *5*(2), 1063–1072. https://doi.org/10.31004/obsesi.v5i2.751

Tegeh, M., & Kirna, M. (2013). *Pengembanagan Bahan Ajar Metode Penelitian Pendidikan Dengan ADDIE Model*.

Wiwin, Wikanengsih, & Suhara, A. (2021). Metode Project Based Learning Berbatuan Media Audio Visual. *AUDIO VISUAL |*, *101*, 2021.