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E-Book Innovation Based on the REACT Learning Model to Improve the Communication Skills of Elementary School Teacher Education Students

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Abstract

This study aims to develop an E-Book based on the REACT learning model (Relating, Experiencing, Applying, Cooperating, Transferring) to improve the communication skills of elementary teacher education (PGSD) students. The research adopted the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). At the analysis stage, students' needs and profiles were identified. The design stage focused on structuring the E-Book integrated with the REACT syntax. The development stage produced a prototype validated by experts. Implementation was carried out through limited and field trials using a One Group Pretest–Posttest design. The limited trial involved 15 PGSD students, while the field (wider) trial was conducted with 40 students. Evaluation was conducted both formatively and summatively. Validation results showed an average score of 88.25% (valid category). The paired sample t-test indicated sign. (2-tailed) = 0.000 < 0.05, proving a significant difference in communication skills before and after using the E-Book. Moreover, the comparison test yielded to count = 11.915 > ttable = 1.684, confirming a meaningful improvement. In conclusion, the REACT-based E-Book developed through the ADDIE model is valid, practical, and effective in enhancing the communication skills of PGSD students and is recommended for wider application in higher education.

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INTRODUCTION

21st-century education faces increasingly complex challenges, particularly those related to the rapid development of information technology, globalization, and social change (Uyar, 2023). The shift in the educational paradigm from teacher-centered to student-centered requires continuous innovation in learning delivery that emphasizes not only cognitive aspects but also affective and psychomotor domains (Hadiyanto, 2024). In this regard, educators are expected to integrate digital literacy, critical thinking, collaboration, and creativity into instructional practices that reflect 21st-century learning competencies (Osiesi & Blignaut, 2025). Therefore, university students, as prospective elementary school teachers, have a strategic role because they will be at the forefront of developing the nation's next generation capable of adapting to the dynamics of modern society (Yedigöz Kara, Baysal, & Ünver, 2025). Strengthening their professional preparation through innovative digital learning models is essential to ensure they are equipped with the pedagogical, technological, and social competencies demanded in today's education era (Uyar, 2023; Hadiyanto, 2024).

One crucial issue of concern in education is the need for 21st-century skills, which generally include the 4Cs (Critical Thinking, Creativity, Collaboration, and Communication) (Thornhill-Miller et al., 2023). These skills are believed to be the primary capital for the younger generation to compete in the global era. While critical thinking and creativity skills relate to problem-solving abilities, communication and collaboration skills relate to how individuals can convey ideas, collaborate with others, and build productive social networks (Simanjuntak, et al., 2023). In the context of elementary education, teachers are central figures in instilling these skills in students (Akmal, et al., 2023). Therefore, students in Elementary School Teacher Education (PGSD) programs need to be well-prepared, not only in terms of subject content knowledge but also in terms of adequate communication skills (Moult et al., 2021). A teacher who has mastery of the material but lacks communication skills will struggle to convey knowledge in a way that is easily understood by students. Likewise, teachers who lack communication skills will face obstacles in building interpersonal relationships with students, parents, and fellow teachers.

This situation underscores the importance of integrating communication skills training into the education process for prospective teachers. The challenges of modern education increasingly demand the integration of digital technology into the learning process, both as media, learning resources, and interaction tools (Dilekçi et al., 2023; Feyza et al., 2023). Therefore, innovative learning media are needed to systematically develop the communication skills of PGSD students, one of which is through the development of an e-book based on the REACT learning model.

Communication skills extend beyond public speaking skills to the ability to formulate arguments, actively listen, provide feedback, and use appropriate communication media (Hasan et al., 2022; Hargie, 2021). In the context of prospective elementary school teachers, communication skills have a broader meaning, namely as a means of building a conducive learning climate, delivering material effectively, and fostering positive classroom interactions.

Research shows that many PGSD students face barriers in communication skills. Saxena et al. (2022) found that most students remained passive in class discussions, lacked confidence during presentations, and struggled to organize ideas logically. Ansari et al. (2022) also revealed that PGSD students' communication skills in group work contexts tended to be low, particularly in providing feedback and asking relevant questions. This is a serious problem because elementary school teachers are required to be able to teach in a communicative, inspiring, and enjoyable manner.

From a national curriculum perspective, the Pancasila Student Profile launched by the Ministry of Education and Culture emphasizes six dimensions, one of which is "critical reasoning" and "mutual cooperation," which are closely related to communication skills (Min et

al., 2023; Nuriya et al., 2023). This means that PGSD students, as future teachers, must first possess strong communication skills to be able to instill them in students from the elementary school level. The development of an increasingly digital global society requires students to master not only conventional oral and written communication but also technology-based communication, such as online discussions, multimedia presentations, and collaboration on digital platforms (Hinza, 2024; Wang, 2024). This further reinforces the urgency that developing PGSD students' communication skills cannot be achieved solely through traditional approaches, but must instead be done through media innovation and learning strategies relevant to the needs of the times.

One rapidly developing form of learning media innovation is the Electronic Book (E-Book). E-Books are digital books that can be accessed via electronic devices such as computers, tablets, and smartphones. Unlike printed books, E-Books offer advantages in flexibility, portability, and interactivity. In the context of higher education, E-Books can be designed to present not only text but also images, videos, animations, and even interactive exercises that allow students to interact directly with the material (Nahotko, M., & Deja, M., 2024; Suriani et al., 2023).

Several studies have shown that the use of E-Books in learning can increase learning motivation, improve learning outcomes, and expand access to information sources (Indrawan et al., 2023; Scott et al., 2022). According to Zulpukarova et al., (2022), who developed an interactive E-Book for elementary school teacher education students, they found that the E-Book increased student engagement and facilitated their understanding of concepts. Most of these studies still focus on improving cognitive aspects or learning motivation; not many have explicitly examined the effect of E-Books on student communication skills. E-Books can be a highly effective medium for developing communication skills. For example, by incorporating discussion features, communication simulations, or presentation exercises, students not only learn content but also practice how to convey ideas. Therefore, the current research challenge is how to design E-Books that serve not only as sources of information but also as a means to actively practice students' communication skills.

To address these challenges, integrating the REACT (Relating, Experiencing, Applying, Cooperating, Transferring) learning model into an E-Book is a relevant solution. The REACT model is a learning strategy (Sitorus, M., & Saragih, M., 2023; Zuve, 2024). This model aims to make learning more meaningful by connecting subject matter with students' real experiences, encouraging them to be actively involved, and facilitating collaboration and knowledge transfer to new situations. The stages in the REACT model are as follows: (1) Relating, At this stage, students are invited to connect learning materials with their previous experiences or knowledge (Khan et al., 2024). For example, in the E-Book, students are given a case study of teacher communication in a real classroom which they then connect with their personal experiences during discussions or presentations. In this way, students learn that communication skills are not just theory, but part of everyday life; (2) Experiencing, This stage emphasizes students' direct experience in learning the material. In the context of E-Books, this stage can be in the form of interactive simulations, communication exercises, or digital role-plays where students are asked to try speaking, writing, or providing feedback. This direct experience is important because communication skills can only develop through repeated practice (Algebar, Z., & Majeed, N., 2023; Syamsuddin, 2024); (3) Applying, At this stage, students are asked to apply communication concepts in solving real problems. For example, they are asked to create presentation scripts, design instructional conversations, or formulate effective discussion questions. This application trains students to think systematically, convey ideas clearly, and adjust their communication style according to the context (Junaidah, 2022; Nurani, 2024); (4) Cooperating, This stage emphasizes student collaboration with group members. Through the E-Book feature, students can have online

discussions, provide comments on friends' answers, or do group work on communication projects. This collaboration is very important because communication is essentially a social skill that develops through interaction with others (Anggiani, 2023); (5) Transferring, The final stage is the transfer of knowledge to new situations. In the E-Book, students are given assignments to practice communication skills in different contexts, for example, developing a communication plan for extracurricular activities or creating learning videos. This stage trains students to apply communication skills flexibly and creatively.

Several studies have demonstrated the effectiveness of the REACT model in improving students' conceptual understanding and skills. Maulana (2024) demonstrated that implementing REACT in mathematics learning significantly improved student learning outcomes. Farida et al. (2023) found that the REACT model can improve junior high school students' critical thinking skills. Similarly, Haetami et al. (2024) demonstrated that the REACT strategy also positively impacts students' communication skills.

The development of REACT-based E-Books is believed to be able to answer the needs of PGSD students to develop their communication skills. By combining interactive digital content and a contextual learning approach, students not only receive material passively, but are also trained to connect, experience, apply, collaborate, and transfer communication skills in various contexts. The use of E-Books in learning has often been seen as an alternative to printed books that are lighter and more practical. However, with technological advances, E-Books can be developed into interactive learning tools integrated with certain learning models, one of which is the REACT model. The integration of REACT in E-Books allows learning to take place more contextually, applicably, and collaboratively. E-Books no longer only present text and images, but can also provide multimedia features, simulations, online discussion spaces, and project-based activities that support the REACT stages (Relating, Experiencing, Applying, Cooperating, Transferring).

With this design, e-books serve not only as a source of information but also as a structured medium for practicing communication skills. REACT-based e-books also support self-regulated learning, allowing students to learn at their own pace while still being guided through systematic learning stages. Numerous studies have been conducted on the use of e-books in education, with results demonstrating significant benefits. Tlili et al. (2022) confirmed that e-books can increase student accessibility and engagement in learning. Burvill et al. (2022) also found that interactive e-books can help PGSD students better understand concepts. However, most of this research focuses on cognitive learning outcomes, not communication skills.

Other studies demonstrate the effectiveness of the REACT model in various subject areas. Fendrik (2024) proved that REACT improves elementary school students' mathematics learning outcomes. Nugraha (2022) found that REACT encourages problem-solving skills. Oktaviani et al., (2025) showed that REACT contributes to improving students' communication skills. Research on communication in elementary school teacher education students still shows weaknesses. Choi, H., & Hur, J. (2023) reported that students tend to be passive in discussions, while Johnson, D., & Coulter-Kern, M. (2024) highlighted students' weak ability to provide feedback. Combining these findings, it can be concluded that E-Books are effective in improving motivation and learning outcomes, but have not been widely developed for communication skills. REACT has been shown to be effective in improving contextual learning, but has not been widely integrated into E-Books. Elementary school teacher education students still have limitations in communication skills, so they need learning media that can train them systematically. From the review above, there are several research gaps, including: The focus of research on E-Books is still predominantly on cognitive aspects. Many studies examine E-Books for conceptual understanding, motivation, or academic learning

outcomes, but rarely highlight their influence on communication skills. The REACT model is rarely integrated into digital media. Although REACT has been proven effective in conventional learning, research combining it with E-Books is still limited. Elementary school teacher education students' communication skills are still lacking. Many research reports and lecturer observations indicate that elementary school teacher education students have difficulty expressing ideas, providing feedback, and actively participating. There is no specific media for training communication.

Most e-books only serve as reading resources, not as a means of structured communication practice. This gap emphasizes the need for research into the development of REACT-based E-Books to improve the communication skills of PGSD students. This research has several objectives, namely: Developing E-Books based on the REACT learning model that are valid, practical, and appropriate to the needs of PGSD students. Testing the effectiveness of the E-Book in improving student communication skills, especially in the aspects of clarity of expression, the ability to provide feedback, and collaborative skills. Providing theoretical contributions in the development of digital and contextual-based learning media. Providing practical references for lecturers, students, and educational media developers in designing technology-based learning that focuses on communication skills.

The novelty of this research lies in the integration of E-Book technological innovation with the REACT model which is focused on improving the communication skills of PGSD students. The novelty of this research includes the development of E-Books not only for delivering content, but also as a medium for practicing communication skills. The integration of the REACT model in the E-Book design so that students go through systematic learning stages: Relating, Experiencing, Applying, Cooperating, and Transferring. The focus of the research is on the communication skills of PGSD students, which previously rarely became a major concern in E-Book development research. Providing practical contributions to the development of PGSD curriculum to be more in line with the demands of the Pancasila Student Profile and 21st century skills.

With the background, urgency, theoretical study, and research gaps outlined, this research is expected to make a tangible contribution to the development of learning in higher education, particularly in the Elementary School Teacher Education (PGSD) study program. The results of this study not only enrich the literature on digital learning media development but also help PGSD students hone their communication skills, which are essential assets for them as future elementary school teachers.

The purpose of this study is to develop an E-Book based on the REACT learning model (Relating, Experiencing, Applying, Cooperating, and Transferring) as an innovative digital learning resource designed to enhance the communication skills of students in the Elementary School Teacher Education (PGSD) program. Through the integration of contextual learning principles within an interactive digital format, the E-Book aims to create meaningful learning experiences that connect theoretical knowledge with real classroom applications. The research also seeks to validate the practicality, effectiveness, and feasibility of the developed E-Book when implemented in higher education learning environments. The findings are expected to provide both theoretical and practical benefits—contributing to the development of literature on digital-based contextual learning, and offering educators a validated, technology-integrated instructional medium that supports active, collaborative, and communication-oriented learning processes suitable for 21st-century education demands.

METHOD

This study uses a research and development (R&D) design by adopting the ADDIE development model, which consists of five stages: analysis, design, development, implementation, and evaluation (Analysis, Design, Development, Implementation,

Evaluation) to produce and test REACT-based E-Books. The effectiveness test uses a one-group pretest–posttest at the implementation stage. The ADDIE model was chosen in this study because it has systematic, coherent, and flexible stages in developing REACT-based E-Books. The ADDIE stages also make it easier for researchers to identify learning needs, design appropriate solutions, develop appropriate products, implement them in the field, and conduct comprehensive evaluations (Adeoye, 2024; Ding, Y., & Toran, H., 2025). The following is the research flow of the ADDIE model.

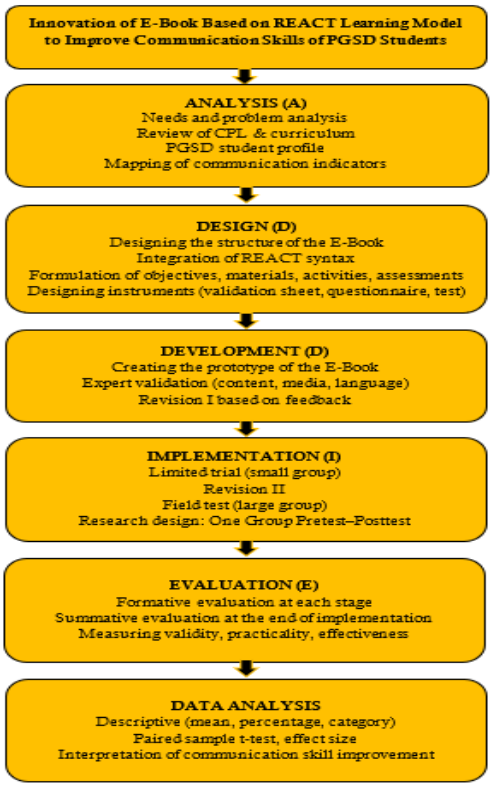


Figure 1. Research Flow

The development process of the E-Book based on the REACT learning model aimed to enhance the communication skills of PGSD (Elementary School Teacher Education) students and was carried out using the ADDIE development model consisting of five main stages: Analysis, Design, Development, Implementation, and Evaluation, followed by Data Analysis. In the Analysis stage, a needs assessment was conducted through a review of the curriculum, learning outcome profiles (CPL), and student characteristics, along with the mapping of communication skill indicators. The Design stage involved planning the structure of the E-Book, integrating the REACT syntax (Relating, Experiencing, Applying, Cooperating, and Transferring), and formulating learning objectives, materials, activities, and assessment instruments such as validation sheets, questionnaires, and tests.

During the Development stage, a prototype of the E-Book was created and validated by experts in terms of content, media, and language. Revisions were made based on expert feedback. The Implementation stage consisted of a small-scale trial followed by a large-scale field test using the One Group Pretest–Posttest design to measure the effect of the E-Book on students' communication skills. The Evaluation stage included formative assessments throughout the development process and a summative evaluation at the end to determine the E-Book's validity, practicality, and effectiveness. Finally, Data Analysis was conducted using descriptive statistics (mean, percentage, category) and inferential analysis (paired sample t-test, and effect size). The results demonstrated an improvement in students' communication skills after the implementation of the REACT-based E-Book.

RESULTS AND DISCUSSION

In data collection, this study used an instrument validation sheet, a questionnaire, and document recording. Instrument validation is necessary to determine whether the instrument can be used in the study. The questionnaire was used to assess the communication skills of PGSD students. Meanwhile, document recording was used to collect data related to the developed e-book design. The following is a summary of the instruments used in this study:

Table 1. Communication Skills Questionnaire

No	Rated aspect	Validator Assessment				
1	Presentation	1	2	3	4	5
	Clarity of the numbering system in the questionnaire					
	Space arrangement/questionnaire item layout					
	Suitability of the font size used in the questionnaire					
2	Contents					
	Compliance of the questionnaire with the indicators					
	The truth of the content used in the questionnaire					
	Conformity to the objectives of communication skills					
3	Language					
	The grammatical correctness of the language used					
	Suitability of sentences to student level					
	The question sentence does not contain double meanings					
	Clarity of instructions or directions					

Table 2. E-book Eligibility

No	E-Book Eligibility	Validator Assessment				
		1	2	3	4	5
1	Clear numbering (format)					
2	Suitability of material with Learning Outcomes (CP) and learning objectives (content)					
3	The material in the E-Book is easy to understand (content)					
4	The material in the E-Book uses the REACT learning model (content)					
5	The material in the E-Book stimulates communication skills (content)					
6	The language used is easy to understand (language)					
7	The sentences used do not give rise to double meanings (language)					

To ensure the feasibility of the values collected from the evaluation by experts, they will be reviewed descriptively. A Likert scale with the following answer alternatives is used to test the product validation data: Very Good (5), Good (4), Enough (3), Not good (2), and Very bad (1). The validity level of the resulting e-book is assessed using this assessment scale. After calculating the validity percentage, the product validity level will be classified based on the percentage range, as shown in Table 3 below:

Tabel 3. Product Validity

Percentage (%)	Valid Criteria
86≤PR≤100	Very good
76≤PR<85	Good
66≤PR<75	Enough
56≤PR<65	Not good
0≤PR<55	Very bad

Based on these categories, researchers can determine whether the e-book development

product is valid or requires further revision. Then, a response questionnaire was used to collect data on student responses to the developed e-book. Next, to analyze the effectiveness of the e-book, two data analysis techniques were used: a paired sample test and an N-gain test. 1) The paired sample test was used to determine the effect of the independent variable on the dependent variable. The significance level used was 5%. Data were analyzed using SPSS version 23, with the criteria that if the significance value (p-value) <0.05, then Ho (the null hypothesis) is rejected and Ha (the alternative hypothesis) is accepted. 2) The N-gain test was used to determine and measure the effectiveness of a learning process by comparing the increase in student understanding between pretest (before learning) and posttest (after learning) scores. The significance level used was also 5%, and the data were processed using SPSS version 23. The same testing criteria applied: if the significance value <0.05, then Ho is rejected and Ha is accepted. Before conducting a hypothesis test, prerequisite tests are first carried out, such as a normality test to ensure that the data is normally distributed and a homogeneity test to check the equality of variance between groups.

This research was conducted in order to develop an E-Book with the REACT (Relating, Experiencing, Applying, Cooperating, Transferring) learning model to improve the Communication Skills of PGSD Students using the ADDIE model development research. The stages of research activities include the analysis stage which includes analysis of student needs and educational contexts related to the development of the E-Book, design in this case making learning objectives and designs to be achieved, development making the E-Book according to the predetermined design, implementation conducting a trial of the E-Book before conducting the research, and evaluation seeing the effectiveness of the E-Book on learning.

Analysis Stage:

At this stage, the needs and problems faced by PGSD students related to communication skills were identified. The analysis included a review of Graduate Learning Outcomes and the curriculum, as well as a mapping of PGSD student profiles. Furthermore, student communication skill indicators were mapped to form the basis for developing instruments and materials for the e-book. The subjects to be studied include basic concepts of Indonesian language, phonology, and other subjects.

Design Stage

After identifying the needs, the e-book structure was designed, integrated with the REACT (Relating, Experiencing, Applying, Cooperating, Transferring) learning syntax. This stage also formulated the learning objectives, materials, activities, and assessments to be used. Furthermore, research instruments such as validation sheets, questionnaires, and tests were developed to measure the feasibility, practicality, and effectiveness of the developed product.

Development Stage

In the development stage, an initial prototype of the E-Book was created according to the design. The prototype was then validated by experts covering aspects of format, material, and language. Based on input from the validators, revision I was carried out to further align the product with learning needs. Based on the results of the E-Book validation conducted by the validators, the highest validation score was achieved for the content feasibility aspect, followed by the textbook format aspect, and followed by the language feasibility aspect. The percentage value obtained from the validation results reviewed by the aspects used can be seen in Figure 2 below.

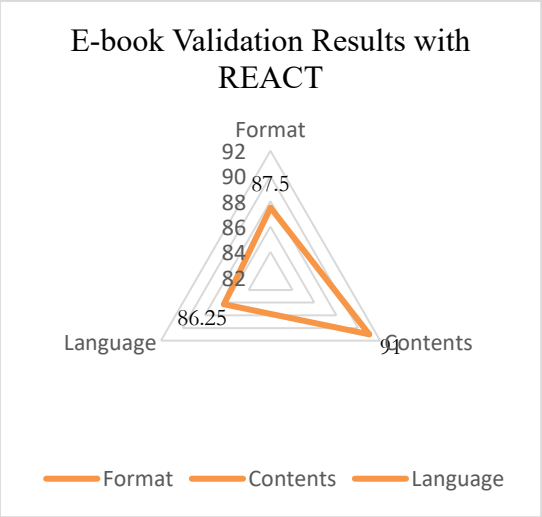
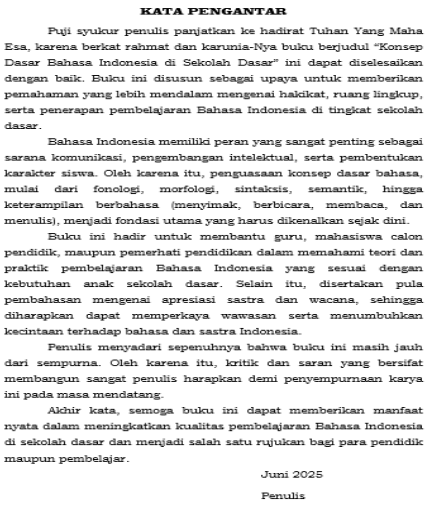


Figure 2. Graph of E-Book Validation Results with the REACT Model

The results of the E-Book validation using the REACT learning model reviewed from the aspects of format, content, and language generally obtained valid category results with an average percentage of 88.25. Based on the validity criteria of PR ≥66, the PR validation of the E-Book exceeded the specified value. Thus it can be concluded that the E-book developed is in the very good category reviewed from the format, content, and language. The results of this study are in line with the research of Isaeva et al., (2024) from the results of data analysis proven that the expert test stated 100% of the results of media experts and 83% for material experts. Furthermore, the product trial by students had two stages, namely a small group test of 80% and a large group test of 81%. Thus the results of the study at SMK Perwari Tulungagung were declared feasible. Furthermore, the research findings of Gao, D., & Nacional, R., (2024) The results of this study indicate that the Relating, Experiencing, Applying, Cooperating, and Transferring (REACT) learning strategy can improve students' mathematical communication skills. This is indicated by an increase in the average score of students' mathematical communication skills between cycles I and II. Students' mathematical communication skills in cycle I reached 56.25, then in cycle II reached 77.19, out of an ideal score of 100.

The e-book includes elements of basic Indonesian language course materials for elementary school students, enriching the learning experience. It provides in-depth explanations of specific topics, making the learning process more dynamic and interactive. All of these elements are designed to make the e-book not only informative but also enjoyable, keeping students engaged and motivated. By incorporating visual design, the e-book provides a more engaging, interactive, and accessible learning experience for online students. Below are some visualizations of the results of creating an e-book for the basic Indonesian language course in elementary school for Elementary School Teacher Education students.

Figure 1. Cover



KATA PENGANTAR

Puji syukur penulis panjatkan ke hadirat Tuhan Yang Maha Esa, karena berkat rahmat dan karunia-Nya buku berjudul "Konsep Dasar Bahasa Indonesia di Sekolah Dasar" ini dapat diselesaikan dengan baik. Buku ini disusun sebagai upaya untuk memberikan pemahaman yang lebih mendalam mengenai hakikat, ruang lingkup, serta penerapan pembelajaran Bahasa Indonesia di tingkat sekolah dasar.

Bahasa Indonesia memiliki peran yang sangat penting sebagai sarana komunikasi, pengembangan intelektual, serta pembentukan karakter siswa. Oleh karena itu, penguasaan konsep dasar bahasa, mulai dari fonologi, morfologi, sintaksis, semantik, hingga keterampilan berbahasa (menyimak, berbicara, membaca, dan menulis), menjadi fondasi utama yang harus dikenalkan sejak dini.

Buku ini hadir untuk membantu guru, mahasiswa calon pendidik, maupun pemerhati pendidikan dalam memahami teori dan praktik pembelajaran Bahasa Indonesia yang sesuai dengan kebutuhan anak sekolah dasar. Selain itu, disertakan pula pembahasan mengenai apresiasi sastra dan wacana, sehingga diharapkan dapat memperkaya wawasan serta menumbuhkan kecintaan terhadap bahasa dan sastra Indonesia.

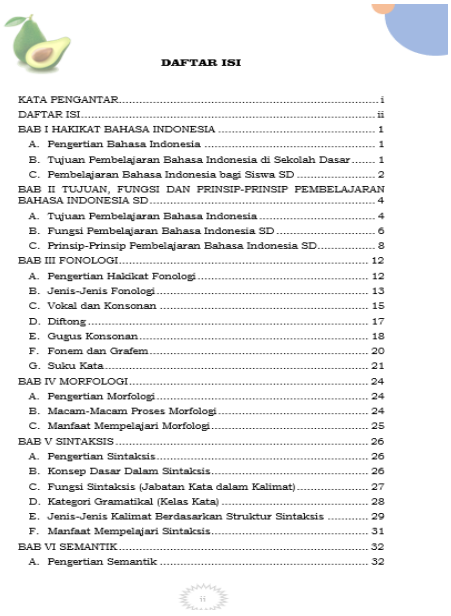
Penulis menyadari sepenuhnya bahwa buku ini masih jauh dari sempurna. Oleh karena itu, kritik dan saran yang bersifat membangun sangat penulis harapkan demi penyempurnaan karya ini pada masa mendatang.

Akhir kata, semoga buku ini dapat memberikan manfaat nyata dalam meningkatkan kualitas pembelajaran Bahasa Indonesia di sekolah dasar dan menjadi salah satu rujukan bagi para pendidik maupun pembelajar.

Juni 2025

Penulis

Figure 2. Foreword



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This e-book provides an in-depth discussion of linguistic aspects, from phonology, morphology, syntax, and semantics, to the development of language skills including listening, speaking, reading, and writing. It also explores the importance of appreciating literature, discourse, and storytelling as an integral part of enjoyable, creative, and meaningful Indonesian language learning. Written in simple, systematic language and brimming with practical examples, this e-book is designed to assist lecturers in developing learning strategies appropriate to their students' developmental stages. It is hoped that this e-book will serve as a primary reference for improving the quality of the teaching and learning process and fostering students' love of Indonesian language and literature.

Implementation Stage

The implementation phase was conducted through a limited trial on a small group of students to assess the initial response and effectiveness of the product. After a second revision based on the results of the limited trial, a field trial was conducted on a larger scale. The research design used was a One Group Pretest–Posttest Design, which allowed for the improvement of students' communication skills before and after using the e-book. Before testing the product's effectiveness, a product test was conducted first by observing the results of a practical test conducted by the validator. The results are as follows.

Table 4. Practicality test

Lecturer Code	Lecturer Response Questionnaire Item Number										Amount	Percentage	Criteria
	1	2	3	4	5	6	7	8	9	10			
Lecturer -01	4	5	4	5	5	4	4	4	4	5	44	88	Very Practical
Lecturer -02	5	4	5	3	4	5	4	3	4	4	41	86	Very Practical
Average value	4.5	4.5	4.5	4	4.5	4.5	4	3.5	4	4.5	42.5	87	Very Practical

From the results of the lecturer response questionnaire obtained from two lecturers as respondents, it can be seen that the percentage value achieved for practicality meets the criteria of very practical. Next, the effectiveness test.

Evaluation Stage

The evaluation stage aims to see the effectiveness of the development of the E-Book with the REACT model as measured through a questionnaire on the communication skills of PGSD students in learning. In accordance with the research design used, namely one group pretest posttest design, the evaluation activity involves pretest and posttest of the communication skills of PGSD students in the basic concepts of elementary Indonesian language course, then the application of the

REACT learning model (Relating; Experiencing; Applying; Cooperating; Transferring). To see the effectiveness of the use of the E-Book, it is necessary to conduct prerequisite tests, namely normality tests and homogeneity tests. If the results of the student's communication skills are normal and homogeneous, it will be continued with a paired sample test to see the average difference between the pretest results and the posttest results of the student's communication skills. Before conducting the test, it must pass the prerequisite tests, namely the normality test and the homogeneity test. The following are the results of the normality test from the results of the student communication skills questionnaire.

Tabel 5. Tests of Normality Communication Skills

	Kolmogorov-Smirnova		
	Statistic	df	Sig.
I-C Pretes	.145	40	.133
I-C Posttes	.166	40	.070

By looking at the data above, the data normality test uses the SPSS version 23 application. The normality test used is the Kolmogorov-Smirnov normality. The basis for decision making if the sig value >0.05 then the data is normally distributed and if the sig value <0.05 then the data is not normally distributed. Based on the data obtained, the pretest sig value is 0.133>0.05 and the posttest sig is 0.070>0.05. So it can be concluded that the results of the pretest and posttest of the communication skills of PGSD students are normally distributed. Next, the homogeneity test will be tested, the results of the homogeneity test can be seen in table 6 as follows.

Tabel 6. Test of Homogeneity Communication Skills

Levene Statistic	df1	df2	Sig.
.377	1	78	.541

Judging from the homogeneity test table, the sig value is 0.541>0.05. If the sig value is >0.05, the data is homogeneous, and if the sig value is <0.05, the data is not homogeneous. The basis for taking the data is the same as the normality test, so it can be concluded that the homogeneity test data is homogeneous. Next, the Paired Samples Test will be carried out, which is a test used to compare the difference between two means from two paired samples, assuming the data is normally distributed. Paired samples come from the same subject, each variable is taken during different situations and circumstances. The following results of the Paired Samples Test can be seen in Table 7.

Tabel 7. Paired Samples Test

	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)

Communication Skills	Pre-test - Post-test	-31.00000	16.45507	2.60177	-36.26259	-25.73741	-11.915	39	.000

Decision making if the significance value (2-tailed) <0.05 indicates a significant difference between the initial variable and the final variable. This shows that there is a significant influence on the differences in treatment given to each variable, but if the significance value (2-tailed) > 0.05 indicates there is no significant difference between the initial variable and the final variable. This shows there is no significant influence on the differences in treatment given to each variable. From the data presented sig. value (2-tailed) 0.000 <0.05 then as the basis for decision making in the paired sample test there is a significant difference between students' communication skills before (pretest) and after (posttest) given learning using E-books with the REACT model. Then if the decision making is based on the comparison of the calculated t value with the basic t table of decision making, namely if the calculated t value> t table then there is a difference in the average communication skills before (pretest) and after (posttest) given learning using E-books with the REACT model, whereas if the calculated t < t table then there is no difference in the average critical thinking skills of students before (pretest) and after (posttest). From the data that has been presented the calculated t value is 11.915> t table 1.684. So it is concluded that there is a difference between the pretest and posttest values. Seen from the tests that have been carried out that the use of E-books with the REACT model teaches effective communication skills used at the South Tapanuli Education Institute, especially PGSD students.

Based on data analysis, this study shows that the use of REACT-based e-books is significantly effective in improving the communication skills of elementary school teacher education students at the South Tapanuli Institute of Education. This main finding is based on the results of a paired sample t-test, which showed a significant difference between pretest and posttest scores, indicating that the designed learning process has successfully achieved its objectives. The selection of the ADDIE model is considered appropriate because it has systematic, coherent, and flexible stages in developing teaching materials (Chai et al., 2025). This is in accordance with Tu et al. (2021) who emphasized that ADDIE is an adaptive instructional design framework for various learning contexts.

The improvement in students' communication skills was statistically significant, as seen from the Sig. (2-tailed) value of 0.000, which is smaller than the significance level of $\alpha = 0.05$. This result is supported by research by Usman et al., (2024) which states that experiential and collaborative learning improves students' communication skills. Furthermore, Musyadad and Lee et al., (2023) proved that the REACT strategy is able to develop students' communication skills through contextual learning activities. This result is further strengthened by the comparison of the t-value of 11.915 which is much greater than the t-table value of 1.684. These figures quantitatively confirm that the intervention using REACT-based E-Books has a meaningful effect and is not caused by chance factors. This improvement indicates that students not only absorb the material but are also able to apply it in better forms of communication. This is in line with research by Permata (2023) which found that the REACT model has a significant effect on students' critical thinking and communication skills. The research results of Lan et al., (2023) also show that REACT-based learning enriched with inquiry experiments improves students' conceptual understanding and communication.

This finding is supported by Sukniasih's (2023) study, which revealed that the REACT strategy in an Augmented Reality-based application improves students' problem-solving abilities, which correlate with communication skills. The REACT effectively improves vocabulary mastery and academic engagement, which are indicators of academic communication (Linh, 2024; Sucahyo et al., 2025). In general, the

results of this study are consistent with Nuraini et al., (2022) who stated that REACT-based learning tools are valid for use in developing student competencies. Zhang et al.'s (2023) research also confirmed the effectiveness of REACT in developing higher-order thinking skills closely related to mathematical communication.

Haetami et al. (2024) found that the implementation of REACT improved learning outcomes and critical thinking skills of high school students, which is in line with the findings of this study. Gao, D., & Nacional, R., (2024) also demonstrated the effectiveness of the REACT strategy in developing mathematical connections and communication. The success of this e-book is also inseparable from the quality of the product developed. The development process using the ADDIE model ensures that the product is designed systematically, through needs analysis, design, development, implementation, and evaluation. This is reflected in the results of expert validation which gave an average score of 88.25% with a very valid category. This high validation score indicates that the e-book is not only content-accurate, but also easy to navigate and visually appealing, which are important factors in maintaining student engagement. This finding is in line with the research of Khan et al., (2024) which states that teaching materials can be categorized as suitable for use if they meet the criteria of validity, practicality, and effectiveness. In line with this, Tlili et al., (2022) also emphasize the importance of expert validation in ensuring the instructional quality of a product.

Overall, these findings provide strong evidence that integrating technology (e-books) with innovative learning models (REACT) can be an effective solution to address challenges in teaching soft skills such as communication. In the context of the South Tapanuli Institute of Education, this e-book can be a valuable and relevant learning asset for PGSD students, preparing them with the communication skills needed as future educators. This product is worthy of wider implementation, in line with Wang's (2024) recommendation that developed products should be tested for effectiveness before mass adoption.

CONCLUSION

Based on the data analysis and discussion that has been described, this study concludes that the REACT model-based E-Book is significantly effective in improving the communication skills of PGSD students at the South Tapanuli Institute of Education. The statistical evidence of this finding is very strong, where the results of the paired sample t-test show a significance value (p-value) of 0.000, which is below the standard $\alpha = 0.05$ ($0.000 < 0.05$). This is further supported by the t-count value of 11.915 which is substantially greater than the t-table of 1.684 (t-count > t-table). Both of these calculation results confirm that the improvement in students' communication skills after treatment is not the result of chance, but rather a real impact of the learning intervention provided.

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