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Development of diagnostic assessment using the I Spring Suite Application in Pancasila Learning in Class V Elementary Schools in Region I, West Padang District

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A B S T R A C T

This type of research is development research (R&D) using the 4D model (Define, Design, Develop, Disseminate). The subjects of the study were 3 experts (media experts, material experts, and language experts), 3 teachers, and fifth grade students at SDN 22 Ujung Gurun, SDN 24 Ujung Gurun, and SDN 05 Padang Pasir. The validation results showed a validity level of 93.75% from media experts, 88.63% from material experts, and 90.6% from language experts, all of which were included in the "very valid" category. Based on the results of teacher and student responses, it is known that the percentage of practicality of learning media at SDN 22 Ujung Gurun reached 92.15% student responses and 95.8% teacher responses, at SDN 24 Ujung Gurun 95.35% student responses and 91.6% teachers, and at SDN 05 Padang Pasir 87.5% students and 95.5% teachers. In addition, the results of the effectiveness test showed an N-Gain value of 0.8054 at SDN 05 Padang Pasir and 0.7825 at SDN 24 Ujung Gurun, including the high category. Thus, it can be concluded that the diagnostic assessment based on i spring suite has been valid, practical, and effective for use in Pancasila learning for grade V elementary school.

1. Introduction

Digital transformation in education has changed the way teachers assess students, from conventional methods to more effective and efficient technology-based assessments (Septyana et al., 2024). As stated bySiti et al, (2023) digital technology-based assessments enable teachers to obtain more accurate information about students' level of understanding and can provide real feedback. The implementation of the Merdeka Curriculum as a development of the 2013 Curriculum has brought significant changes to the Indonesian education system, including in the aspect of learning assessment. According to Yolanda et al., (2024) The Independent Curriculum emphasizes the importance of diagnostic assessment as an instrument to identify students' learning difficulties more precisely and provide appropriate interventions. This is in line with the demands of 21st century

education which prioritizes individual learning and a deep understanding of the needs of each student. Appropriate diagnostic assessment can help teachers design more effective remedial programs and significantly improve student learning outcomes (Adek et al, 2023). In the context of Elementary School, diagnostic assessment becomes increasingly important considering that this phase is the initial foundation for the formation of students' basic knowledge and skills.

The development of learning technology has given rise to various platforms and applications that can support the implementation of digital diagnostic assessments. One of the potential applications to be developed is I Spring Suite, which offers interactive features and ease of use in the assessment process. As expressed Palguna et al., (2020) The use of interactive multimedia used as a learning medium with I Spring Suite software can be used as a variation of learning media to increase student motivation and creativity. The media used makes students active in the learning process. In addition, it can be used as a comparative material to develop better learning media. The media used increases student interest and motivation.

I Spring Suite is one of the digital learning content development software that functions as an authoring tool to create interactive presentation-based media. This application is directly integrated with Microsoft PowerPoint, making it easier for teachers and media developers to create interesting and interactive learning materials (Nasution, Hanifah Nur, 2023). By using I Spring Suite, users can add interactive elements such as quizzes, animations, audio narration, and video content that can be accessed online. The main advantage of I Spring Suite lies in its user-friendly interface and the feature of exporting results into HTML5 format, so that the material can be accessed through various devices such as computers, tablets, and smartphones (Faridawaty, 2022). I Spring Suite also provides various quiz templates such as multiple choice, true-false, matching, and drag and drop which are very useful in implementing diagnostic assessments. Teachers can use this feature to measure students' initial level of understanding efficiently before learning begins. In addition, this media allows for direct integration of audio and video elements, so that learning becomes more contextual and interesting for elementary school students (Nasution, Hanifah Nur, 2023).

Based on the results of observations and interviews conducted on November 5-7, 2024 in three elementary schools in the Cluster I area of Padang Barat District, namely SDN 22 Ujung Gurun, SDN 05 Padang Pasir, and SDN 24 Ujung Gurun, it was found that learning in grade V is still dominated by conventional methods such as lectures and the use of textbooks, while the use of interactive learning media and technology-based applications such as I Spring Suite has not been implemented optimally. At SDN 22 Ujung Gurun, although there are computers, their use in learning is not optimal, and teachers are not yet familiar with the I Spring Suite application as an assessment and interactive learning media. At SDN 05 Padang Pasir, teachers occasionally use Wordwall and YouTube, but the frequency is low and has not been systematically integrated into learning, while the I Spring Suite application has not been utilized at all. A similar thing was also found at SDN 24 Ujung Gurun, where the computer laboratory was not utilized optimally and teachers did not yet have an understanding of the integration of learning technology,

including the use of I Spring Suite. All three schools demonstrated an urgent need for improving teachers' digital competencies and optimizing technological infrastructure so that learning is more interactive and diagnostic assessments can be conducted more accurately and effectively.

The purpose of this study is to develop a diagnostic assessment based on the iSpring Suite application integrated with the Merdeka Curriculum, especially in Pancasila learning in grade V of Elementary School Region I, Padang Barat District. This study aims to provide an initial assessment tool that is innovative, interactive, and easily accessible to teachers and students, in order to identify the level of students' understanding of Pancasila values before the learning process begins. This is important considering that conventional diagnostic assessments that have been used so far are still monotonous and less effective in capturing students' individual learning needs.

To achieve these goals, researchers used the 4D development model (Define, Design, Develop, and Disseminate). At the Define stage, researchers conducted a needs analysis through observation, interviews with teachers, and document studies to identify weaknesses in the Pancasila diagnostic assessment that has been used so far. The Design stage was carried out by designing an interactive assessment format based on iSpring Suite that includes Pancasila value indicators that are in accordance with the learning outcomes of the Merdeka Curriculum. The Develop stage was carried out by developing and validating digital assessment products by experts, as well as conducting limited trials on students to assess the clarity, readability, and effectiveness of the media. At the Disseminate stage, the product was further developed based on the results of the trial and feedback, and socialized to other teachers in the research area. With this approach, it is hoped that the diagnostic assessment developed will be able to help teachers understand students' initial conditions and design more relevant, participatory, and meaningful Pancasila learning.

2. Methodology

Development research is a term that is often used for research and development methods which in English is called Research and Development (R&D). According to Rahman & Latif, (2020) Research and Development (R&D) is the process of researching consumer needs and then developing products to fulfill those needs. According to Rahman & Latif, (2020) stated that development research is research that produces certain products and tests the effectiveness of the product. Development research is not research to find a theory, but rather research that is used to develop or produce a product through certain stages, until a product is produced that has been tested for its level of validity, practicality, and effectiveness against needs. In this case, the author developed a diagnostic assessment using the I Spring Suite application.

This study uses the 4D four-D models. According to Thiangarajan in (Mulyatiningsih, 2015)The development of the four-D model consists of 4 main

stages, namely: (1) define (determining the material); (2) design (design); (3) develop (development); and (4) Disseminate (Dissemination). In this case, the author will develop a diagnostic assessment product using the I Spring Suite application in Pancasila Learning in grade V on the material of maintaining the unity of the Republic of Indonesia. At the Define stage in the development of a diagnostic assessment based on learning media, the researcher conducted a series of systematic activities to identify needs and formulate the basis for development.

This stage begins with Front-end Analysis, namely observation and interviews with teachers at elementary schools in Area 1, Padang Barat District to find out the main problems in the learning process that require intervention in the form of interactive media. Furthermore, Learner Analysis is carried out to identify the characteristics of grade V students as development targets, such as learning styles, initial abilities, and learning motivation. Then Task Analysis is carried out to analyze learning objectives and main materials in the Pancasila subject for grade V, so that the media developed is relevant to the competencies that students must master.

The validation instrument for the learning media developed against the quality that has been designed by the author which is reviewed from the aspects of media, language, and materials. For data collection, the instrument used is a validation questionnaire. This instrument is used to evaluate the appropriateness of content, alignment with learning outcomes, accuracy of information, relevance of material, and elements that can stimulate students' curiosity, as detailed in Table 1.

Table 1. Media Expert Instruments

No	Aspect	Question Items	Question Number
1	Appearance	Attractive front cover	1
2		Accuracy of font selection	2
3		Accuracy of font color	3
4		Image display quality	4
5		Accuracy of background sound selection	5
6		Accuracy of background selection	6
7		Slide design	7
8	Programming	Flexible (can be used independently and under guidance)	8
9		Interactive button completeness	9
10		Ease of use of interactive buttons	10
11		Product packaging display	11

Source: Modification Syahroh, (2024)

The language validation instrument used is a language validation questionnaire. This instrument functions to evaluate the language aspects in learning media, as well as providing input in cognitive diagnostic assessments. The aspects assessed include readability, appropriateness of terminology, clarity of sentences, and paragraph cohesion, as detailed in Table 2.

Table 2. Language Expert Instruments

No	Assessment Details	Question Number
1	The shape and size of the letters used are easy to read	1
2	The description of the information presented in the cognitive diagnostic assessment is easy for students to understand.	2
3	Cognitive diagnostic assessments use simple, clear and easy-to-understand sentences.	3
4	Cognitive diagnostic assessments use good and correct Indonesian language rules or in accordance with EBI	4

Source: Adapted from Syahroh, (2024)

Validation testing by material experts aims to assess the feasibility of content, systematic presentation, and various aspects related to the suitability of the material to the curriculum. The instrument used is a cognitive diagnostic assessment validation questionnaire designed to assess the clarity of indicators, the accuracy of questions to learning objectives, and the depth of the material. Details of the assessment indicators are presented in Table 3.

Table 3. Material Expert Instruments

No	Assessment Details	Question Number
1	Truth of the material	1
2	Clarity of material	2
3	Easy to understand material	3
4	Completeness of materials	4
5	The material contained in the cognitive diagnostic assessment refers to the independent curriculum.	5
6	Level of material importance	6
7	Questions to measure students' assignment of material	7
8	Adapting to developments in science and technology	8
9	Usefulness of the material	9

Source: Modified from Syahroh, (2024)

Based on the validation results, the researcher revised and refined the media to ensure that the media was suitable for use in learning. After the media was declared valid, the researcher continued with a practicality trial, namely implementing a diagnostic assessment on fifth grade students at elementary schools in Area 1, Padang Barat District to determine the level of ease of use of the media by teachers and students in the context of real learning. For teachers and students, a practicality questionnaire was prepared to obtain responses to the level of practicality of the learning media developed in the context of classroom learning. This instrument was filled out by teachers after they had carried out the learning process using the media.

The following presents a grid of instruments for teachers, which evaluates aspects such as ease of use, clarity of instructions, time required, usefulness in learning, and feasibility of implementation in teaching and learning activities, as shown in Table 4.

Table 4. Teacher Responses

No	Indicator	Question Number
1	Language used	1
2	Sentences presented	2
3	Ease of Presenting Concepts to Students	3.4
4	Use of images according to the material	5
5	Media Work Steps	6
6	Student media interest	7

Source : Putri & Citra, (2019)

Student responses are used to obtain responses to the practicality of the Independent Curriculum learning media that has been developed. This instrument is filled in by students after following the learning process using the media. The grid of the student questionnaire instrument, which evaluates several important aspects, is shown in Table 5

Table 5. Student Response Questionnaire

No	Indicator	Question Number
1	Display of learning media	1
2	Language in learning media	2
3	Use of writing, colors and images in learning media	3
4	Instruction Which clear on mediaLearning	4
5	Interest in using media	5
6	Help understand readingand communicate using media	6
7	Activeness in the learning process	7

Source :Putri & Citra, (2019)

The dissemination or distribution stage is the final stage in the research process. At this stage, researchers disseminate the results and findings of their research to a wider audience (Riani Johan et al., 2023). The main objective of this stage is to communicate and disseminate new knowledge obtained from the research. In this case, the author disseminated it in elementary schools in area 1, Padang Barat sub-district.

Data Analysis Techniques

To test the validity of the developed product, the opinions of experts/validators are used. The validation instrument used is a questionnaire sheet to collect valid data regarding the cognitive diagnostic assessment developed, experts are asked to fill out the instrument sheet that has been provided. The instrument provided has 4 answer choices according to the content of the question. The assessment score for each answer can be seen in Table 6 below:

Table 6. Expert Validation Assessment Criteria

Symbol	Information	Score
SV	Very Valid	4
V	Valid	3
TV	Invalid	2
STV	Totally Invalid	1

Source:Rohendi et al., (2023)

To determine the validation of the three aspects, namely media, material and language aspects, the maximum score is determined on the validation sheet. To measure the results of the validator's assessment, calculate the score obtained and look at the product validity category in table 7.
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Table 7. Validity Criteria

Achievement Level	Information	Notes
81-100%	Very Valid	Very Good/No Revision Needed
61-80%	Valid	Worthy/Needs Revision
41-60%	Invalid	Not Suitable/Needs Revision
<40%	Totally Invalid	Not Eligible/Needs Revision

Source: Adapted from Puspitasari & Febrinita, (2021)

To measure the practicality of the developed learning media by analyzing the observation data of the student and teacher response questionnaires. The data obtained from the teacher and student response questionnaires were analyzed using provisions based on the modified answer categories from those confirmed in the following table 8:

Table 1. Teacher and Student Questionnaire Assessment Scale

Score	Information
4	Very Agree
3	Agree
2	Don't agree
1	Strongly Disagree

Source : A. Putri & Reinita, (2023)

The practicality category of learning media based on value calculations can be seen in the following table 9:

Table 2. Learning Media Practicality Category

Range	Category
75% - 100%	Very Practical
50% - 75%	Practical
25% - 50%	Quite Practical
0% - 25%	Not Practical

Source :Syahroh, (2024)

To find out to what extent the developed iSpring Suite media is able to improve student learning outcomes in Pancasila learning in class V SDN Region I, Padang District. The effectiveness of the media is measured through a comparison between the pretest and posttest values given to students before and after using the media with the N-Gain score analysis, the effectiveness categories are in the following table 10.

Table 10. N Gain score

N-Gain Range	Effectiveness category
$g \geq 0.70$	Tall
$0.30 \leq g < 0.70$	Currently
$g < 0.30$	Low

Source : Oktavia et al., (2019)

3. Result and Discussion

Validation Test Results

After the initial product was developed, a validation stage was carried out to test the feasibility and quality of the media. Validation was carried out by three experts, namely material experts, language experts, and media experts. Each provided input related to the content of the material, clarity of language, and technical media used. The validation results showed that the media was declared feasible with minor revisions, especially in terms of narrative and visual integration. Based on these results, the researcher revised the product according to the experts' suggestions before proceeding to the next stage. Furthermore, the revised media was tested through a practicality trial on teachers and grade V students in area 1, Padang Barat District. Teachers were asked to provide responses through a questionnaire regarding the ease of use and suitability of the media for learning. Likewise, students were asked to fill out a questionnaire to assess interest, ease of understanding the material, and comfort in using the media. The results of the practicality test showed a very practical category, both in terms of teachers and students.

In addition, researchers also conducted an effectiveness test by comparing students' pretest and posttest scores using this diagnostic assessment media. The results of the analysis showed a significant increase in student learning outcomes after using the media, with N-Gain values in the medium to high category. This indicates that the media developed is not only feasible and practical, but also effective in improving students' understanding of Pancasila material. The following are the results of the validity, practicality and effectiveness tests using the I Spring Suite media that have been carried out.

A. Media Expert

The validity test of the developed learning media was carried out by expert media validators from among the Elementary Education lecturers of Padang State University. Validation was carried out twice, namely on February 17, 2025 and February 24, 2025. This validation aims to assess the feasibility of media design from the graphic aspect, aesthetic appearance, consistency of presentation, and suitability to student characteristics.

The media validation questionnaire instrument consists of 11 statement items covering the appropriateness of content, language, presentation form, and graphics.

In the first stage of validation, it shows that the media still needs to be revised to be suitable for use. Some suggestions for improvement from the validator include:

a) The media is improved with the use of softer colors.
b) a more structured layout

The results of the second stage of validation in table 11 show an increase to 88.63%, which is included in the "Very Valid" category, so that the media is declared suitable for use.

Table 11. Media Expert Validation

No	Assessment Aspects	Rating 1	Assessment 2
1	Attractive front cover	3	4
2	Accuracy of font selection	3	3
3	Accuracy of font color	3	4
4	Image display quality	4	3
5	Background sound selection features	3	4
6	Accuracy of background selection	3	3
7	Slide design	3	4
8	Flexible	3	4
9	Interactive button completeness	4	4
10	Ease of use of interactive buttons	4	4
11	Product packaging display	4	4
	Score obtained	36	41

B. Subject Matter Expert

Validation of the material aspects was carried out by expert validators from the field of Elementary Education, Adzkia University. The validation process was carried out once on February 18, 2025. The purpose of this validation was to ensure the accuracy of the material, suitability with basic competencies, and the relevance of the material to students' real lives. The validation results showed a value of 93.75%, included in the "Very Valid" category. This can be seen in table 12.

Table 12. Subject Matter Expert Validation

No	**Rated aspect**	**Evaluation**
1.	Students are able to demonstrate attitudes towards maintaining unity in their daily environment.	4
2.	Students can recognize the characteristics of the Indonesian nation	4
3.	Attitude can find attitudes and behaviors that respect diversity	3
4.	Presentation of material according to the needs of grade V students	4
5.	The material is relevant to the competencies that students must master	4
6.	Clarity of material presented in teaching materials	4
7.	The truth of PPkn material	4
8.	Presentation of complete and coherent description of the material	4
9.	Relevance of questions to material	3
	Total score	30

C. Linguist

Language validation was carried out by linguists who have competence in the field of Elementary Education at Adzkia University. Validation was carried out in two stages, namely on February 10, 2025 and February 13, 2025. This validation assesses aspects of readability, clarity of sentences, and the appropriateness of language use with the developmental stage of elementary school students. In the first validation, several terms were found that were considered less appropriate to students' cognitive abilities. After revisions, such as simplifying sentence structures and replacing technical terms with vocabulary that is easier to understand, the results of the second validation showed a score of 94.6%, which is in the "Very Valid" category. This can be seen in table 13.

Table 13. Linguist Validation

No	Assessment Aspects	Rating 1	Assessment 2
1.	Terms used and in accordance with the characteristics of grade V students	3	4
2	Conformity with good and correct Indonesian language rules	3	4
3	Use of polite language	4	4
4	The language used is effective and efficient	3	4
	Total score	13	16

With these results, the linguistic aspects of the media are considered appropriate and the media is declared worthy to proceed to the practicality test stage. After going through the development stages according to the 4D model, the final product was obtained in the form of digital diagnostic assessment media designed using the iSpring Suite application. This media was developed to support the implementation of the Merdeka Curriculum, especially in Pancasila learning in grade V of elementary school. This diagnostic assessment contains various forms of interactive questions, such as multiple choice, drag and drop, and concept matching, which are designed to explore students' initial understanding of Pancasila values as a whole.

This media is compiled based on the learning achievements and characteristics of students at the elementary school level, with an attractive and easy-to-use display, both by teachers and students. The following is documentation of the diagnostic assessment media that has been developed, including the interface, types of questions, and interactive features used. The following images and tables provide a visual depiction of the structure and design of the resulting product. The following are the validation stages that have been carried out.

The media (Figure 1) is presented with bright, colorful visuals that are in accordance with the imagination of elementary school students. The design is not only eye-catching, but also gives a friendly impression and is in accordance with the language such as Replace the word kamu with ex ananda.

Figure 1. Adjustment to Indonesian Spelling

Media (Figure 2) The combination of attractive images and informative sound makes this media more lively, fun, and encourages active student involvement in the learning process.

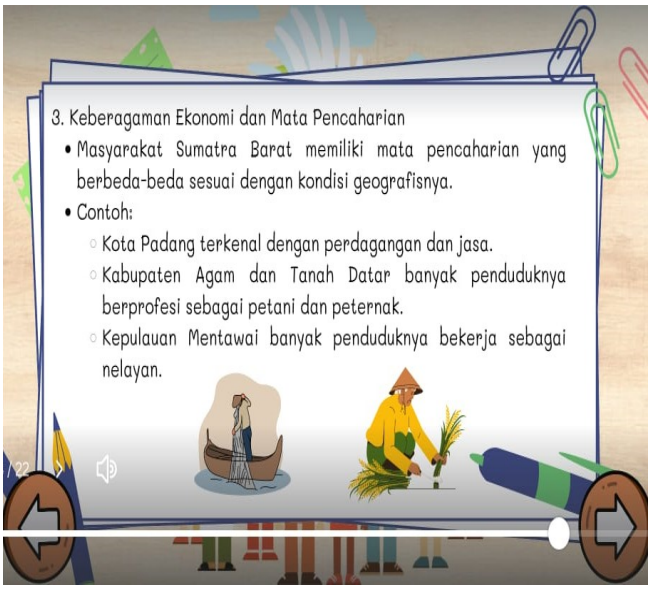

Figure 2. Adding Sound Features

The media (Figure 3) shows that this approach aims to ensure that students not only understand the material theoretically, but are also able to relate it to their real experiences.

Figure 3. Relates the Material to Everyday Life

Based onresultsdevelopment stage, it can be concluded that the developed diagnostic assessment media has met the validity criteria of three aspects, namely media, material, and language aspects. The validation results that show these three aspects confirm that the designed media is already in the "very valid" category and is suitable for use in the learning process. Revisions made based on expert input have succeeded in improving the quality of the media, both in terms of visual appearance, clarity of material, and use of language that is appropriate to the level of student development.

Next, this learning media will be continued to the practicality and effectiveness stage, namely by testing it directly in class V of elementary school area 1, Padang Barat District. At this stage, the media will be assessed in terms of ease of use (practicality) by teachers and students, and its impact on learning effectiveness will be seen, especially in helping teachers identify students' initial understanding and determine appropriate learning follow-up. The results of this practicality stage can be seen from the responses of teachers at SDN 05 Padang Pasir, SDN 22 Ujung Gurun and SDN 24 Ujung Gurun as seen in table 14 below.

Table 14. Teacher Responses

Name	Score	Criteria
SDN 05 Padang pasir	95.5%	Very practical
SDN 24 Ujung gurun	91.6%	Very practical
SDN 22 Ujung gurun	95.5%	Very practical

The results of this stage can be seen from the responses of students at SDN 05 Padang Pasir, SDN 22 Ujung Gurun and SDN 24 Ujung Gurun as seen in table 15 below.

Table 15. Student Responses

Name	Score	Criteria
SDN 05 Padang pasir	87.5%	Very practical
SDN 24 Ujung gurun	95.35%	Very practical
SDN 22 Ujung gurun	92.15%	Very practical

The results of this effectiveness stage can be seen from the responses of teachers at SDN 05 Padang Pasir and SDN 24 Ujung Gurun as seen in table 16 below.

Table 16. Results of Effectiveness Data

Name	N Gain Score	Criteria
SDN 05 Padang pasir	0.8054%	Very effective
SDN 24 Ujung gurun	0.7825%	Very effective

Validity Test Result Data

The test data of the validity of the diagnostic assessment of grade V Elementary School developed using the I Spring Suite application showed very good results. The media validity test by the media validator obtained a score of 88.63%, which is included in the "very valid" category. The material validity test obtained a score of 93.75%, also included in the "very valid" category. Meanwhile, the language aspect validity test obtained a score of 94.6%, which was also considered "very valid".

Practical Data

The trial was conducted at SDN 22 Ujung Gurun with a student response of 92.15% and a teacher response of 95.5%, at SDN 24 Ujung Gurun with a student response of 95.35% and a teacher response of 91.6%, and at SDN 05 Padang Pasir with a student response of 87.5% and a teacher response of 95.5%. All response results from SDN Region I, Padang Barat District are in the "practical" category. These results indicate that the developed learning media is very appropriate and easy to use in the Pancasila learning process in accordance with the Merdeka Curriculum approach, which emphasizes active student involvement and meaningful learning.

Effectiveness Data

The results of the analysis show that in SDN 05 Padang Pasir, the average N-Gain value is 0.8054, which is in the high category, indicating the effectiveness of learning media in improving student understanding. In SDN 24 Ujung Gurun, the average N-Gain value is 0.7825, also in the high category, indicating significant learning outcomes. Overall, both schools showed very good learning outcomes, with an N-Gain value of more than 0.7, indicating that the learning media used were effective in creating meaningful and positive learning experiences. The effectiveness test was conducted to determine the extent to which the learning media developed had an impact on student understanding.

The results of the effectiveness test at SDN 24 Ujung Gurun showed an increase in learning outcomes after the use of media. Complete data on the results are presented in Table 17.

Table 17. Results of the Effectiveness test of SDN 24 Ujung Gurun

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Score	26	.50	1.00	.7825	.16679
Increase in Percentage	26	50.00	100.00	78.2536	16.67867
Valid N (listwise)	26				

The results of the effectiveness test at SDN 05 Padang Pasir showed an increase in learning outcomes after the use of media. Complete data on the results are presented in Table 18.

Table 18. Results of the Effectiveness Test of SDN 05 Padang Pasir

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Score	28	.50	1.00	.8054	.15313
Ngainprsen	28	50.00	100.00	80.5364	15.31338
Valid N (listwise)	28				

4. Conclusion

This study aims to develop learning media using the iSpring Suite application in Pancasila learning in grade V of Elementary School. The media products developed have met the established indicators and are adjusted to the development of the current curriculum, especially the Merdeka Curriculum. This media is designed with language that is easy to understand for grade V elementary school students, making it easier for them to understand the learning material. The media design is also attractive, which can increase students' enthusiasm and motivation during the learning process.

The validity of this learning media was tested by validators in the fields of media, language, and materials, consisting of Elementary Education lecturers and Indonesian Language lecturers, and has met the criteria for being suitable for use in product trials. The results of the trial showed that this media is very practical to use, as reflected in the responses of teachers and students at SDN 05 Padang Pasir, SDN 22 Ujung Gurun, and SDN 24 Ujung Gurun, all of which showed results in the category "practical." In addition, the results of the effectiveness test using N-Gain showed that this learning media was effective in improving student understanding, with an N-Gain value above 0.7 in all schools tested, indicating that this media was successful in creating a meaningful learning experience and had a positive impact on student understanding.

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