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The effectiveness of interasolve-book in improving learning independence and problem-solving skills of elementary school students

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Abstract

This study aims to test the effectiveness of using an interasolve-book as a learning medium in improving learning independence and problem-solving skills in elementary school students. Interasolve-book is an interactive book designed to stimulate students' critical thinking and problem-solving skills through engaging and relevant activities. The research method used is quantitative with a quasi-experimental design. The research subjects consisted of grade V students at SDN Handayani and SDN Rancabakti, which were used as an experimental group using an interasolve-book and a control group using conventional textbooks. A questionnaire measures learning independence, while a test measures problem-solving ability. The results show that using an interasolve-book significantly improves students' learning independence and problem-solving ability compared to conventional textbooks. This can be seen from the average score of students' learning independence and problem-solving ability in the experimental group, which was higher than that of the control group. The conclusion is that an interasolve-book can be an effective alternative learning medium to improve elementary school students learning independence and problem-solving skills. The implication of this study is the need for the development and application of interasolve-book in learning in elementary schools to improve the quality of education.

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1. Introduction

Elementary schools have a crucial role in shaping the foundation of students' cognitive abilities and character, especially in the face of an increasingly dynamic development of the times, where every individual, including students, must have independent learning abilities and problem-solving skills. These two abilities are essential keys to facing academic and real-life challenges. Learning independence is an important aspect of educational development because independent students are more effective in acquiring knowledge and skills (Mulyadi & Syahid, 2020). Students learning independence makes them take the initiative to solve problems without the help of others, so they will try their best to get high learning outcome scores/scores (Riyanti et al., 2021). Learning independence allows students to take responsibility for their learning process.

Problem-solving skills can equip students with the skills to deal with complex challenges and situations in everyday life. Problem-solving skills provide direct experience to students to increase their ability to construct, understand, and apply the concepts they have learned (Sumiantari et al., 2019).

Problem-solving is essential in daily life, work, education, and many other aspects (Rahman, 2019). Problem-solving skills are one of the crucial 21st-century skills for students to master as a provision to face the Industrial Revolution 4.0 (Dewi et al., 2021).

The reality in the world of education often shows that many elementary school students still rely on the help of teachers and are poorly trained in solving problems systematically (Pitriana et al., 2024; Sari & Tarihoran, 2024) In other words, not all elementary school students have optimal learning independence and problem-solving skills. Several factors, such as less attractive learning methods, lack of adequate interaction between teachers and students, and limited learning resources, can be obstacles (Lestari et al., 2024). This condition triggers the need for innovation in learning methods to encourage students to be more independent and creative in facing various problems.

One of the innovations carried out is the use of interactive learning media. Interasolve-Book, for example, is a digital learning medium designed to train learning independence and problem-solving skills. Interasolve-book offers an engaging and interactive approach to improving elementary school students' learning independence and problem-solving abilities. Interasolve-book presents learning materials visually and actively engages students in the process of exploration and discovery.

Interasolve-book is an advanced version of interactive e-books designed to provide a more dynamic and interactive reading experience and a more attractive flip-shaped display. The term interasolve-book is derived from a combination of the words "interactive", "solve", and "e-book", which aims to spur active involvement of students in solving problems and increasing learning independence. InteraSolve-Book contains learning materials in text, images, sounds, and videos that can be used to improve student understanding with various learning styles.

This study aims to test the effectiveness of the interasolve-book in improving elementary school students' learning independence and problem-solving ability. This research is expected to provide a clear picture of the potential and advantages of the interasolve-book as a modern learning tool. In addition, the findings of this study are expected to be a reference for educators in choosing and developing learning methods that suit the needs of students in the digital era. Thus, efforts to create an independent generation that can solve problems effectively can be realized more optimally.

2. Method

This study uses the quasi-experimental method of the nonequivalent control group type. Quasi experimental nonequivalent control group. Quasi experimental nonequivalent control group. Quasi-experimental is the development of a purely experimental design that is difficult to implement, has many control groups but does not fully control external variables, makes it better than pre-experimental designs and is often used due to difficulties in obtaining an ideal control group (Sugiyono, 2013) Meanwhile, the Nonequivalent Control Group refers to the experimental group and the control group is not selected through a random process (Hardani et al., 2020; Wibawa et al., 2020) This experimental quasi-book is used to test the practicality and effectiveness of interasolve-book in improving learning independence and problem-solving skills.

The population is grade V students in Cluster II, Nanggung District, Bogor Regency. Sample selection is carried out using the purposive sample technique, where purposive sampling is a sampling that is carried out by considering certain factors following the criteria that have been set to determine the number of samples to be used in the study (Arikunto, 2013 Sugiyono, 2013) The control class is V at SDN Handayani, while the experimental class is at SDN Rancabakti.

Data collection instruments, such as pretest and post-test question sheets, are used to measure the improvement of students' understanding after being given specific treatment. The data collected from the pretest and post-test were analyzed quantitatively. For data that met the normality assumption, an independent sample t-test was used to see the significant difference between the pretest and post-test values in the experimental and control classes. If the normality assumption is not met, the Mann-Whitney test is used. All tests use a significance level (Sig.) of 0.05.

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The validity test was calculated using the Pearson product-moment formula (Sahir, 2001) as follows:

$$r_{xy} = \frac{N\sum xy - (\sum x)(\sum y)}{\sqrt{(N\sum x^2 - (\sum x)^2)(N\sum y^2 - (\sum y)^2)}}$$

correlated (x = X – X and y = Y –Y)
N = number of subjects
Σxy = sum of times x by y
Σx = Total sum x
Σy = Total sum y
Σx2 = square of x
Σy2 = square of y

As for the reliability test, the Alfa Cronbach test technique (Sugiyono, 2007) was used with the following formula:

$$r_i = \frac{k}{(k-1)}\left\{1 - \frac{\Sigma s_i^2}{s_t^2}\right\}$$

Information:
r1 = Instrument reliability
k = Mean squared between subjects
ΣSi2 = number of variants of items/items
St2 = total variance

The normality test used Shapiro Wilk because the sample in this study was less than 50. This follows the opinion of Arikunto (2013), who stated that the Shapiro-Wilk test is suitable for determining the normality of data with a sample of less than 50. In addition to the normality test, a homogeneity test was also carried out. The homogeneity test is one of the statistical tests that must be taken to determine whether a population or group has the same variant (Nuryadi et al., 2017; Usmadi, 2020).

3. Results

The data generated from the post-test value of the development trial is used as test material to determine the level of validity and reliability of the question instrument. The validity test was carried out using IBM SPSS version 26 software to make it easier to calculate. The testing technique in using Pearson Product Moment is based on decision-making: if the value of Sig. (2-tailed) < 0.05, it is declared valid, while if the value of Sig. (2-tailed) > 0.05 is declared invalid.

Table 1. Post-test validity test calculation results

Correlations			
Question No.	**Criterion**	**Result**	**Interpretation**
1	*Sig. (2-tailed)*	0,000	Valid
2	*Sig. (2-tailed)*	0,000	Valid
3	*Sig. (2-tailed)*	0,000	Valid
5	*Sig. (2-tailed)*	0,007	Valid
6	*Sig. (2-tailed)*	0,045	Valid
7	*Sig. (2-tailed)*	0,002	Valid
8	*Sig. (2-tailed)*	0,001	Valid
9	*Sig. (2-tailed)*	0,000	Valid
10	*Sig. (2-tailed)*	0,013	Valid

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Based on the test results, it can be seen that the Sig significance value (2-tailed) contained in the total score column for questions number 1 to question number 10 shows a < value of 0.05, so it can be concluded that all questions are valid.

Table 2. Results of reliability test calculation of post-test questions

Cronbach's Alpha	Total Question (N)
0,868	10

The calculation results showed that the Cronbach Alpha score of the tested questions was 0.868. If referring to the basis for decision-making from Wiratna Sujarweni (2014), which states that the test results are reliable if the Cronbach Alpha value is >0.6, then it can be concluded that all of these questions are reliable so that they can be used as a data collection instrument to determine the level of students' problem-solving skills. In addition to being carried out on test questions that measure student problem solving, validity and reliability are also carried out on the student learning independence questionnaire instrument. This is done to find out whether the instrument is suitable to be used as material for data collection.

Table 3. Results of the calculation of the validity test of the independence questionnaire

Indicator	Criterion	Result	Interpretation
X1A	*Sig. (2-tailed)*	0	Valid
X1B	*Sig. (2-tailed)*	0	Valid
X2A	*Sig. (2-tailed)*	0,027	Valid
X2B	*Sig. (2-tailed)*	0,009	Valid
X3A	*Sig. (2-tailed)*	0,004	Valid
X3B	*Sig. (2-tailed)*	0,028	Valid
X4A	*Sig. (2-tailed)*	0	Valid
X4B	*Sig. (2-tailed)*	0,015	Valid
X5A	*Sig. (2-tailed)*	0,002	Valid
X5B	*Sig. (2-tailed)*	0,024	Valid
X6A	*Sig. (2-tailed)*	0,028	Valid
X6B	*Sig. (2-tailed)*	0	Valid
X7A	*Sig. (2-tailed)*	0,028	Valid
X7B	*Sig. (2-tailed)*	0,016	Valid
X8A	*Sig. (2-tailed)*	0,021	Valid
X8B	*Sig. (2-tailed)*	0,024	Valid
X9A	*Sig. (2-tailed)*	0,005	Valid
X9B	*Sig. (2-tailed)*	0,02	Valid

The test results of the student learning independence instrument using SPSS showed that all questions received a score of Sig. (2-tailed) < 0.05. So, the conclusion obtained from the validity test results is that it is a valid instrument.

Table 4. Results of the reliability test of the learning independence questionnaire

Cronbach's Alpha	Total Question (N)
0,887	18

The reliability test results showed that the Cronbach Alpha value was 0.887 > 0.6. With these results, the instrument of student learning independence is said to be reliable for research. Questions tested for validity and normality are then given to students as pretest and post-test questions in the experimental and control classes. The data generated from the student learning independence questionnaire is on an ordinal scale. This data comes from a questionnaire on student learning independence shared after learning in the experimental and control classes. The process of converting

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ordinal scales to interval scales uses the help of MSI (Method of Successive Interval) software, an add-in for Microsoft Excel.

Table 5. Results of conversion of ordinal data to digital in experimental classes

X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18
2,764	2,866	3,445	1,857	3,658	2,516	3,766	4,239	2,599	2,786	3,707	2,435	3,871	3,282	2,477	3,144	2,349	3,574
2,764	1,936	3,445	3,918	3,658	2,516	2,728	4,239	3,707	2,786	3,707	2,435	1,936	3,282	2,477	2,212	2,349	3,574
1,000	1,936	1,000	2,730	1,953	3,568	1,000	2,044	1,000	1,946	1,000	1,000	1,000	1,864	2,477	3,144	2,349	3,574
1,000	2,866	1,857	1,000	3,658	1,000	2,044	3,051	3,707	1,000	2,760	1,000	1,000	1,864	1,634	1,000	1,000	3,574
2,764	1,936	3,445	2,730	3,658	1,849	3,766	2,044	2,599	3,918	1,000	1,780	1,936	3,282	2,477	1,000	2,349	2,148
1,000	2,866	3,445	2,730	3,658	2,516	3,766	2,044	2,599	3,918	1,000	2,435	2,769	3,282	1,000	3,144	1,000	3,574
1,893	2,866	3,445	2,730	3,658	1,849	3,766	3,051	3,707	1,946	2,760	3,542	2,769	2,350	3,780	2,212	3,707	3,574
1,893	1,000	2,407	3,918	2,647	3,568	2,044	4,239	2,599	2,786	3,707	1,780	2,769	3,282	2,477	3,144	2,349	3,574
2,764	2,866	3,445	2,730	1,000	3,568	3,766	3,051	1,849	1,000	2,020	3,542	1,936	1,000	3,780	1,000	3,707	2,148
2,764	1,000	1,857	3,918	1,000	3,568	3,766	3,051	1,849	1,000	2,020	3,542	1,936	1,000	3,780	1,000	3,707	2,148
2,764	1,936	1,857	1,857	1,953	2,516	2,044	3,051	1,849	2,786	2,020	2,435	2,769	1,864	2,477	1,813	2,349	2,148
4,101	4,082	3,445	3,918	2,647	3,568	3,766	4,239	3,707	2,786	3,707	3,542	3,871	3,282	3,780	3,144	3,707	3,574
2,764	2,866	2,407	2,730	2,647	2,516	2,728	3,051	2,599	2,786	2,760	2,435	2,769	2,350	2,477	2,212	2,349	2,148
1,893	1,000	2,407	1,857	2,647	1,000	3,766	1,000	2,599	1,000	2,760	1,000	3,871	1,000	3,780	1,000	2,349	3,574
1,000	4,082	1,000	2,730	1,953	1,849	2,728	2,044	1,000	1,946	2,020	2,435	2,769	1,000	2,477	1,813	2,349	1,000
1,000	2,866	3,445	1,000	1,953	1,000	2,044	3,051	1,000	1,946	2,020	1,000	1,000	2,350	1,000	3,144	1,000	3,574

Table 6. Control class ordinal data to digital conversion results

X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17	X18
1,000	1,000	1,000	1,000	1,000	1,000	1,949	1,000	2,091	1,000	1,000	2,239	2,503	2,542	2,503	1,889	1,000	2,723
1,000	1,000	1,000	1,000	1,000	2,918	1,000	2,239	3,182	2,636	1,000	2,239	2,503	2,542	2,503	1,000	1,000	2,723
2,636	3,250	2,600	2,600	2,723	2,918	2,980	2,239	1,000	2,636	2,328	3,431	2,503	4,045	2,503	1,000	1,000	2,723
1,000	1,000	2,600	2,600	2,723	2,918	1,949	2,239	3,182	2,636	1,000	2,239	2,503	2,542	2,503	1,000	1,000	2,723
1,000	1,000	1,000	1,000	2,723	2,918	2,980	2,239	3,182	2,636	2,328	3,431	2,503	1,000	2,503	2,778	2,636	2,723
1,000	1,000	1,000	2,600	2,723	2,918	1,000	1,000	1,000	2,636	1,000	1,000	1,000	2,542	1,000	2,778	1,000	1,000
1,000	1,000	1,000	2,600	2,723	2,918	1,000	1,000	1,000	2,636	1,000	1,000	1,000	2,542	1,000	2,778	1,000	1,000
2,636	2,329	2,600	1,000	2,723	2,918	2,980	3,431	2,091	1,000	3,416	2,239	4,045	2,542	4,045	1,000	2,636	2,723
2,636	2,329	2,600	2,600	2,723	2,918	2,980	3,431	2,091	1,000	2,328	1,000	2,503	4,045	2,503	2,778	2,636	2,723

The conversion results were then tested for normality using Shapiro-Wilk because the number of sample data was less than 30 with a significance value of 5% (0.05). The test results are as follows:

Table 7. Shapiro Wilk normality test for learning independence

Class	Data	*Sig.*	Conclusion
Experiment	16	.356	Normal
Control	9	.071	Normal

Based on the calculation results, it was found that the Sig. The value for the experimental class was 0.356, while the Sig. The value for the control class was 0.071. The two Sig. Values> 0.05, so it can be concluded that the data on student learning independence for the experimental and control classes are typically distributed.

Furthermore, because all data were distributed normally, the homogeneity and T-tests, the homogeneity value can be seen from Sig—Levene's Test for Equality of Variances. In table 8, the value is 0.987. Because the Sig value > 0.05, it can be concluded that the learning independence data is homogeneous.

Table 8. Results of the learning independence homogeneity test

Levene's Test for Equality of Variances		Interpretation
F	Sig.	
0,000	0,987	Data homogen

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Table 9. Results of the learning independence test

Null Hypothesis (H0)	Test Type	Sig. *(2-tailed)*	Decision
There was no difference in problem-solving skills in the experimental class and the control class	t-test for Equality of Means	0,030	Reject H0

Table 9 shows the results of the T-test for learning independence. The value for the basis of decision-making can be seen from the Sig. (2-tailed) column. Based on the results of the interpretation of the Sig. (2-tailed) value of 0.030 < 0.05, H0 was rejected and H1 was accepted. Thus, it can be concluded that there is a difference in student learning independence between the experimental and control classes. Students' problem-solving skills were analyzed based on pretest and post-test data from the product trial stage in development testing through learning in experimental and control classes. The testing stage begins with a normality test of pretest and post-test.

Table 10. Shapiro Wilk pretest normality test problem-solving ability

Class	Data	*Sig.*	Conclusion
Experiment	16	0,022	Abnormal
Control	9	0,172	Normal

The results of the pretest normality test showed that for the experimental class, the values of Sig. 0.022 < 0.05. With these results, it was concluded that the data of the pretest values of the experimental class were abnormally distributed. Meanwhile, for the control class, Sig. 0.172 > 0.05 showed standard distributed data.

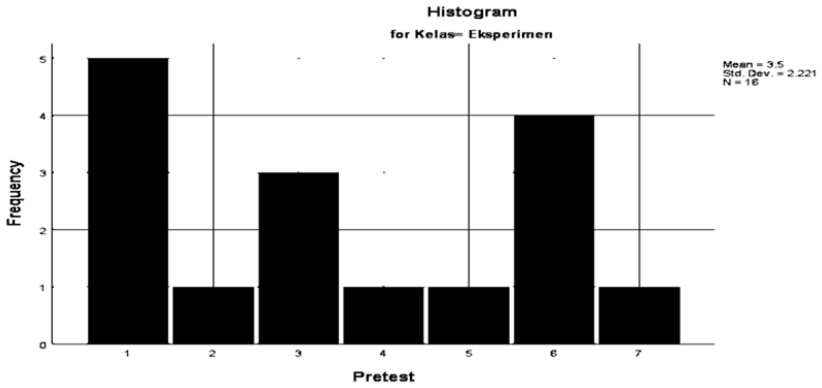

Figure 1. Experimental class pretest diagram

Based on the test results in the experimental class, hypothesis testing cannot use a parametric t-test. For this reason, the following hypothesis test uses the non-parametric Mann-Whitney U Test.

Table 11. Man Whitney pretest test results for problem-solving skills

Null Hypothesis (H0)	Test Type	Sig. *(2-tailed)*	Decision
There was no difference in problem-solving skills in the experimental and control classes.	Independent-Samples Mann-Whitney U Test	0,598[a]	Receive H0

The results of the Mann-Whitney test in Table 11 show the value of Sig. 0.598 > 0.05. Thus, H0 is accepted. The statement to accept H0 is also seen in the test results in the decision column, which states That the null hypothesis should be retained. Thus, the conclusion obtained after conducting the pretest hypothesis test with the Mann-Whitney U Test was that there was no difference in the student's problem-solving ability in the pretest in the experimental class and the control class.

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Table 12. Shapiro Wilk post-test normality test problem-solving ability

Class	Total Data	*Sig.*	Conclusion
Experiment	16	0,023	Abnormal
Control	9	0,208	Normal

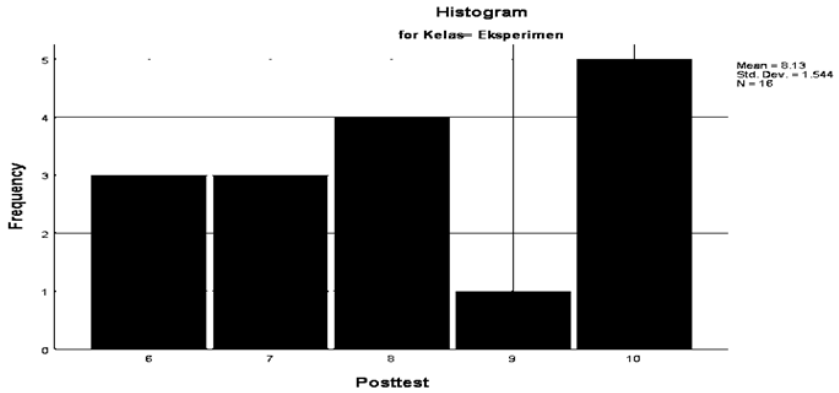

Figure 2 Experimental class post-test diagram

Furthermore, for the results of the post-test normality test (in **Table 12**), it was known that the Sig. The value of the experimental class was 0.023, and the Sig. The value of the control class was 0.208. So, for the normality of the post-test of the experimental class with a value of Sig. < 0.05, the data is not normally distributed, and for the control class, the value of Sig. > 0.05 indicates typically distributed data. The abnormality of the experimental class data does not allow the hypothesis test for post-test data to be carried out using the non-parametric statistical test Mann Whitney U Test.

Table 13. Man Whitney post-test results problem-solving ability

Null Hypothesis (H0)	Test Type	Sig.	Decision
There is no difference in problem-solving abilities in the experimental and control classes.	Independent-Samples Mann-Whitney U Test	0,000[a]	Tolak H0

After the Mann-Whitney test for the post-test data of the experimental class and control class, the results obtained were the value of Sig. 0.000 < 0.005 was obtained. With these results, H0 was rejected, and H1 was accepted. The statement of rejecting H0 is also seen in the results of the Mann-Whitney test in Table 4.16 (Decision). Thus, it can be concluded that there is a difference in students' problem-solving abilities after using an interasolve-book in learning.

4. Discussion

4.1 Towards learning independence

Learning independence needs to be possessed by students because it can increase effectiveness in acquiring knowledge and skills. Independent students can explore the subject matter before and after learning in the classroom (Riyanti et al., 2021). By independent learning, students will continue to learn to improve their understanding of something fascinating without coercion or orders from others. Students will have extensive knowledge and thinking power as a provision for their lives in society. Thus, students with high earning independence will proactively complete the assigned tasks (Rudiawan et al., 2023).

Interasolve-book is an interactive learning platform that combines digital textbook elements with rich multimedia features, and it has excellent potential to increase student learning independence. Features such as animations, videos, and simulations make the subject matter more engaging and easy to understand. Interasolve-book is expected to attract interest in learning so that students have the independence to learn by themselves.

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Testing the effectiveness of interasolve-book in learning goes through several stages. The initial stage is to convert the questionnaire score data on an ordinal scale into an interval scale. Why should I convert ordinal data to interval data? According to Arikunt (2013), ordinal data is qualitative data categorized and arranged based on a certain level or rank, meanwhile, according to. Meanwhile, the ordinal scale is a measurement scale that not only groups data but also shows the order or hierarchy between these categories (Sugiyono, 2007). Based on this explanation, ordinal data can be synthesized as the value of the group's ranking in a particular order. This ordinal data cannot be calculated to find the average because no definite boundary exists between one category group and another. Meanwhile, to determine the value of this effectiveness, the average was calculated using a comparison of the experimental class and the variable class using parametric or non-parametric statistics.

The interval data obtained from the conversion results were then tested for normality as a prerequisite for conducting a hypothesis test. The normality test was carried out with SPSS using the Shapiro-Wilk method. According to Sugiyono (2007), Shapiro Wilk is a test to determine the random data distribution of a small sample with several less than 50. The test showed that the data was indicated to be expected. The results of this normality test determine the following type of statistical test for drawing hypothesis conclusions, whether parametric or non-parametric. Because the data indicated normal, the hypothesis test used the parametric T-test.

After the normality test is carried out, the homogeneity test is continued, an additional prerequisite to conclude the T-test. The homogeneity test results showed that the data were homogeneous or had similar group characteristics. The T-Test (Individual Sample T-Test) was carried out to test the hypothesis with decision-making criteria: reject H0 if the value of Sig. < 0.05, accept H0 if Sig. > 0.05. Since the value of Sig. (2-tailed) = 0.030 is less than 0.05 (the commonly used limit of significance), H0 is rejected. Therefore, there is a sinister difference between the experimental and control classes, so it can be concluded that InteraSolvE-Book effectively increases students' learning independence.

These results follow research from Saputra and Alexon (2023), which shows that the development of Android-based interactive multimedia has been effectively used by students. Another study conducted by Fajrie et al. (2021) showed the success of increasing learning independence, with its conclusion stating the effectiveness of project-based e-module products in increasing learning independence.

The reality that occurred in the classroom during the study supports the conclusion about the effectiveness of the InteraSolvE-Book. The experimental class students seemed more independent, judging from their seriousness in paying attention and looking for information from the InteraSolvE-Book. Students focus on finding answers to problems given in the group LKPD by repeatedly looking at the information available in the interasolve-book, such as reading texts, looking at pictures and listening to videos. Meanwhile, in the control class, only a few students focused on doing the LKPD by searching for the given reading sources; other students were seen chatting and doing activities outside of filling out the LKPD. However, this cannot be used as a data source because no observation instruments are prepared to record students' independence from attitudes. This is one of the shortcomings in this study that may be considered in future studies or similar studies.

4.2 On students' problem-solving skills

The ability to solve problems is a thinking skill that allows individuals to face difficulties, analyze conditions, and find the right solutions. This is in line with the opinion of Sumiantari et al. (2019) in the previous discussion, which stated that the ability to solve problems provides a direct experience for students to improve their ability to build, understand, and apply the concepts learned. In line with this opinion, (Kurniawati et al., 2019) said that when students are used to facing problems in learning, they will be able to prepare better mentally for students to face difficulties in the real world. Thus, problem skills are essential for everyone to maximize their potential.

The effectiveness of the interasolve-book in improving student problem-solving is known by analyzing pretest and post-test answers for students in the experimental and control classes. As in the learning independence test, the initial calculation to determine the student's problem-solving ability is

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also done by testing whether the data is usually attributed. The normality test is used to determine the following type of test. The test results showed that the data derived from the pretest and post-test values in the experimental class were indicated to be abnormal.

Data abnormalities were obtained from the results of the experimental class answers, both for the pretest with a Sig. Value of 0.022 and the post-test with a Sig. Value of 0.023. The score is not eligible for the standard criteria. The data is said to be expected if the value of Sig. > 0.05. Data abnormalities can also be seen from the histogram (figure 4.1), which tends to be asymmetrical. If interpreted, the data has a peak at the beginning and tends to decline with several peaks to its right. A histogram is said to have a normal distribution if it is symmetrical and resembles a bell curve without inclination to one side (Santoso, 2015). The histogram for the post-test data (**Figure 2**) also shows an asymmetrical tendency, being on the right side. This indicates some extreme values on the right end of the distribution. By referring to Santoso's statement again, the post-test data of the experimental class proved to be abnormal.

With these results, the testing process can still be carried out to conclude whether InteraSolvE-Book influences improving students' problem-solving ability. Further testing is carried out using non-parametric statistics as an alternative if one of the conditions for the parametric test is not met. The non-parametric test used is the Mann-Whitney test. The basis for decision-making for the Mann-Whitney test, according to Santos (2015), is to accept H0 and reject Ha if the value of Sig. (probability) > 0.05; Reject H0 and accept Ha if Sig. (probability) < 0.05.

Based on the results of Mann Whitney's test, a Sig. A value of 0.598 was obtained for the pretest data, with a Sig. If the value is more significant than 0.05, then H0 is accepted. Therefore, it can be concluded that there is no improvement in students' problem-solving skills before learning between the experimental class and the control class. The absence of differences in problem-solving skills is possible because students have not carried out learning, so they do not know or understand the concepts asked in the pretest question sheet. Knowledge or understanding of concepts will be obtained after students get an explanation from the teacher in the control class or the InteraSolvE-Book in the experimental class. The results of the actual improvement/difference in students' abilities will be obtained after the learning takes place by looking at the post-test results.

Retesting is performed for data derived from post-test values. Mann Whitney's non-parametric test was carried out again, considering that the post-test data of the experimental class was not standard. The Mann-Whitney test conducted produced a Sig. Value of 0.000. Because the Sig. The value is less than 0.05, which is used as a significant value for decision-making, but H0 is rejected. Based on the test results, it can be concluded that there is a substantial difference between the problem-solving ability of students in the experimental class compared to the control class. Thus, it is proven that an interasolve-book can improve students' problem-solving skills.

5. Conclusion and Implications

Based on the results and discussions, an interasolve-book has improved students' learning independence and problem-solving skills. This is characterized by students' activeness in observing and using the interasolve-book during learning and a significant improvement in problem-solving skills after applying this tool. These findings imply that an interasolve-book can be an effective learning tool to create a more dynamic and participatory learning environment. In addition, this success shows that technology-based teaching materials such as the interasolve-book can support modern curricula that emphasize self-paced learning and the development of 21st-century skills, such as critical thinking and analytical. The findings also open opportunities for developing more innovative interactive teaching materials and encourage further research to test their effectiveness in a broader context. Thus, the interasolve-book not only contributes to improving the quality of learning but also becomes the first step in encouraging student independence and the development of more adaptive learning methods in the future.

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