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The Effect of the ALBICI Model Assisted by *Handouts* in Improving the Understanding of Mathematics Concepts in Grade IV at MIN 5 Bandar Lampung

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ABSTRACT

Learning mathematics at school base Still face challenge in increase understanding draft students , as indicated by the low Indonesia's achievements in TIMSS 2019 and PISA 2022. Conditions This reinforced by the results pre research in class IV MIN 5 Bandar Lampung which showed 100% of students Not yet achieve KKTP and low achievements in each indicatounderstanding concept . Research This aim For know the influence of the ALBICI (Active Learning Based Interactive Conceptual Instructions) model assisted by handouts on understanding draft mathematics students . The method used is a quantitative approach with a quasi-experimental design using experimental and control groups. Data collection techniques were carried out through concept understanding tests that had been tested for validity and reliability, then analyzed using statistical tests. The results of the study showed that there was a significant increase in the understanding of mathematical concepts of students who learned using the ALBICI model assisted by handouts compared to conventional learning. This model is able to encourage activeness, interaction, and help students build concepts independently through contextual media support. Thus, it can be concluded that the application of the ALBICI model assisted by handouts is effective in improving the understanding of mathematical concepts of elementary school students.

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1. INTRODUCTION

Mathematics learning in elementary schools remains a significant concern in the world of education, particularly in terms of conceptual understanding. Conceptual understanding is important because students are not only expected to calculate correctly, but also to explain mathematical ideas, represent concepts, connect one concept with another, and apply concepts in problem-solving situations. In elementary school practice, many students still experience difficulty understanding the meaning of mathematical concepts and tend to memorize formulas or procedures without knowing how and why they are used. Globally, the results of international studies such as TIMSS 2019 show that Indonesian students' conceptual thinking skills are still below the international average, with a score of 397 compared to the standard of 500 (Hamzah & Dahlan, 2023). This finding is in line with the results of PISA 2022, which ranked Indonesia 73rd out of 81 countries with a mathematics score of 366, still far from the OECD average of 472. Furthermore, PISA 2022 reported that only a small proportion of Indonesian students reached the minimum level of mathematical proficiency, which indicates that many students still have difficulty interpreting, applying, and reasoning with mathematical concepts in simple contexts. This condition indicates that mathematics learning tends to be oriented towards procedural memorization rather than in-depth conceptual understanding, so that students experience difficulty in linking and applying concepts in various contexts (Darmawati, 2024).

This problem is also found in the context of elementary school learning, particularly in fractions and other basic mathematical concepts. Teacher-centered learning practices result in students being less actively involved in the learning process (Deppong, Monoarfa, & Ermita 2025). As a result, students tend to memorize formulas without understanding their meaning and application. Several previous studies have shown that active and innovative learning models can improve students' cognitive abilities, including understanding mathematical concepts. However, most of these studies focus solely on the application of learning models without integrating them with learning media that support systematic concept construction (Saputro, 2025).

The urgency of this research is further strengthened by the results of pre-research at MIN 5 Bandar Lampung, which showed that 100% of fourth-grade students had not achieved the learning objectives achievement criteria (KKTP). Furthermore, the achievement of conceptual understanding indicators remained in the low range, at around 40–42% for each indicator. Interview results also indicated that learning was still dominated by lecture methods, limited media use, and a lack of connection between the material and students' real-life contexts. These conditions demonstrate the need for learning innovations that not only increase student engagement but also strengthen conceptual understanding in a deep and meaningful way.

One alternative that can be used is the *Active Learning Based Interactive Conceptual Instruction* (ALBICI) learning model, which emphasizes active student involvement in constructing knowledge through interaction, discussion, and concept exploration (Fadly, 2022). This model can be combined with the use of *handouts* as a learning medium that presents material concisely, systematically, and contextually (Falihah, Istiqfaroh, & Rohmah, 2024). Several studies have shown that the ALBICI model can improve critical thinking skills and conceptual understanding, while the use of handouts has been shown to help students understand the material in a more structured manner. However, studies that integrate these two components in mathematics learning in elementary schools are still limited.

Based on the description, this study aims to determine the effect of the ALBICI model assisted by *handouts* on the understanding of mathematical concepts of fourth-grade students at MIN 5 Bandar Lampung. This study is expected to provide theoretical contributions in the development of constructivism-based learning models integrated with learning media, as well as practical contributions as an alternative innovative learning strategy to improve the quality of mathematics learning in elementary schools, especially in strengthening students' conceptual understanding.

Mathematics learning is essentially oriented towards developing conceptual understanding as the foundation for logical and systematic thinking. From a constructivist perspective, learning is an active process in which students construct knowledge through experience and social interaction (Lestari and Liberna 2025). Vygotsky's social constructivism theory emphasizes the importance of interaction in shaping understanding, while Bruner, through *discovery learning,* asserts that knowledge becomes more meaningful when discovered by students themselves. In this context, mathematical conceptual understanding is defined as students' ability to organize knowledge, connect concepts, and apply them flexibly in problem-solving (Suhirman et al. 2025). Indicators of conceptual understanding include the ability to restate concepts, classify objects, provide examples and non-examples, represent concepts, and apply them in various situations.

In line with framework mentioned , learning model *Active Learning Based Interactive Conceptual Instruction* (ALBICI) is here as an integrated approach principle *Active learning and interactive conceptual instruction* . This model emphasizes active student involvement in the learning process through discussion, exploration, and conceptual reflection. ALBICI facilitates a learning process that is not solely teacher-centered but also encourages students to construct knowledge independently. Furthermore, the use of learning media such as *handouts* acts as a cognitive aid that presents material concisely, systematically, and contextually. *Handouts* help students understand the core of the material, organize information, and strengthen concept retention (Andriani et al. 2024). Thus, the conceptual integration of the ALBICI model and handouts is believed to be able to optimally improve mathematical concept understanding.

Several previous studies support the effectiveness of active learning models in improving students' cognitive abilities. Research Lintang & Widayati (2025) used an experimental approach on high school students and found that the application of the ALBICI model was able to improve critical thinking skills through systematic discussion and reflection activities. Furthermore, research Muslimah, Sapti, & Nugraheni (2024) using a *quasi-experimental method* showed that the ALBICI model assisted by *Quizizz* significantly improved learning motivation and numeracy skills of vocational high school students. Another study Dahlia & Mubarak (2024) used the *Contextual Teaching and Learning model* assisted by *handouts* on junior high school students and found a significant increase in student learning outcomes compared to conventional learning.

Furthermore, research Neneng & Imran (2025) using an experimental approach showed that *the Take and Give model* , assisted by handouts, significantly improved elementary school students' science learning outcomes. Research Tahsinia, Nurhayanti, & Kusmawati (2022) used classroom action methods in *Realistic Mathematics Education* (RME) learning and found a gradual increase in students' understanding of mathematical concepts from 40% to 92%. In general, these studies confirm that active, contextual learning supported by appropriate learning media can significantly improve students' conceptual understanding and learning outcomes.

However, there are research gaps that require further study. Most previous studies have focused solely on the implementation of learning models or the use of media separately. Research related to ALBICI has generally not been widely applied at the elementary school level, and has focused more on improving critical thinking or numeracy skills without specifically examining mathematical concept understanding Tahsinia, Nurhayanti, and Kusmawati (2022) . Furthermore, research on *handouts* tends to position them as passive supporting media, rather than as an integral part of interactive learning strategies. Thus, theoretically and empirically, there are still limitations in studies that integrate conceptually based active learning models with structured learning media into a single, cohesive learning design (Ghaniya, 2025).

Based on the literature review, it can be concluded that the integration of the ALBICI model with *handouts* has great potential in improving students' understanding of mathematical concepts. However, research specifically testing this combination at the elementary school level is still limited. Therefore, this study aims to fill this gap by empirically examining the effect of the ALBICI model with *handouts* on students' understanding of mathematical concepts. The scientific contribution of this study lies in strengthening the constructivist learning framework integrated with learning media, as well as providing alternative learning innovations that are more effective and contextual in improving the quality of mathematics learning in elementary schools.

2. RESEARCH METHODOLOGY

This study used a quantitative approach with a *quasi-experimental* research type (Albina, 2025). The quantitative approach was chosen because this study aims to test the hypothesis objectively through numerical data and statistical analysis (Putra, Morphew, & Tan, 2023). The design used was *a nonequivalent control group design* Ariawan et al. (2025) , which involved two groups, namely the experimental class and the control class without full randomization. The selection of design This based on conditions unpaved field allows distribution subject in a way random, but still allows giving treatment for test connection cause and effect between variable.

The research was conducted at MIN 5 Bandar Lampung, located at Jl. Pulau Tegal No. 21, Sukarame, Bandar Lampung City. The research activities were carried out during the 2025/2026 academic year. This location was chosen because the results of the pre-research found that students' understanding of mathematical concepts was still relatively low, making it relevant to the research objectives.

The population in this study was all 155 fourth-grade students of MIN 5 Bandar Lampung. The sampling technique used cluster sampling, which is the selection of samples based on existing groups (classes). The research sample consisted of two classes, namely class IVD as the experimental class with 40 students who were given the ALBICI learning model treatment assisted by handouts, and class IVC as the control class with 40 students who used conventional learning. The sample selection was based on the equality of class characteristics as well as considerations of efficiency in conducting the research (Putra, Morphew, & Tan 2023).

The research instrument used was a mathematical concept understanding test in the form of descriptive questions. The instrument was compiled based on indicators of conceptual understanding which include the ability to restate concepts, classify objects, provide examples and non-examples, represent concepts, and apply concepts in problem solving. The instrument validation process was carried out through two stages, namely content validity and construct validity. Content validity was conducted by involving expert judgment to assess the suitability of the test items with learning objectives, indicators of mathematical concept understanding, material coverage, language clarity, and the appropriateness of the question construction.

Based on the expert validation results, several items were revised and eliminated so that the remaining items were considered relevant and feasible to measure students' mathematical concept understanding. Construct validity was then examined empirically through item validity testing to determine whether each item was able to represent the construct of mathematical concept understanding. Before use, the instrument was tested for validity and reliability (Muslimah, Afriyadi, & Farida, 2025). The validity test was carried out using *product moment* correlation , while reliability was tested using the *Cronbach Alpha coefficient* . The test results showed that most of the test items were valid and the instrument had a high level of reliability, making it suitable for use in research (Zayrin, 2025) . Data collection techniques were carried out through tests (pretest and posttest) to measure students' initial and final abilities, as well as documentation as supporting data.

Data analysis was conducted descriptively and *inferentially* . Descriptive analysis was used to describe the characteristics of the data through the average value, standard deviation, and minimum and maximum scores (Noviana, Ifrianti, & Asiah, 2025). Before testing the hypothesis, prerequisite analysis tests were conducted including the normality test using *the Shapiro-Wilk Test* and the homogeneity test using *Levene's Test* (Subhaktiyasa et al. 2025). Furthermore, hypothesis testing was conducted using the *Independent Sample t- test* to determine significant differences between the experimental and control groups (Tiana, Fatmawati & Hertati 2025). In addition, the N-Gain test was used to determine the level of improvement in students' conceptual understanding (Erawati, Riswari, & Amaliyah, 2025) . All data analysis was performed with help device SPSS software.

3. RESULTS AND DISCUSSION

Study This aim For test the influence of the ALBICI (Active Based Learning Interactive Contextual Interaction) learning model assisted by handouts on ability understanding draft mathematics participant The presentation of research results is carried out systematically , starting from testing the suitability of the instrument, analyzing the characteristics of the test items, to analyzing student learning outcome data and testing the hypothesis.

Table 1. Validation of Trial Test Questions for Conceptual Understanding

V a li da t o r	**Question understanding Draft**	
	Before V a li da s i	**After V a li d a s i**
Hasan Sastra Negara M. Pd	15 questions	10 Questions

Based on Table 1, it can be seen that of the 15 items developed, only 10 were deemed suitable for pilot testing. This result indicates that approximately one-third of the initial items did not meet the eligibility criteria, both in terms of indicator suitability and item construction quality. Methodologically, this reduction process is crucial because it demonstrates that the instrument was not used directly, but rather underwent a rigorous academic selection process. Therefore, the items used in the pilot testing phase had a strong foundation of content validity and were relevant to the research objectives.

After being declared content-appropriate, the instrument was then tested for its empirical validity to determine the extent to which each question item was able to measure the construct of conceptual understanding statistically.

Table 2. Results of the Validity Test of the Concept Understanding Test

No B u ti r	$r_{x(y-1)}$	r_{tabel}	Conclusion
1	0.047	0.334	Invalid
2	0.416	0.334	Valid
3	0.869	0.334	Valid
4	0.869	0.334	Valid
5	0.747	0.334	Valid
6	0.159	0.334	Invalid
7	0.556	0.334	Valid
8	0.464	0.334	Valid
9	0.541	0.334	Valid
10	0.628	0.334	Valid

Based on Table 2, it is known that 8 of the 10 questions have a calculated r value greater than the r table (0.334), so they are declared valid. Meanwhile, questions number 1 and 6 are declared invalid because they have a very low correlation value. If analyzed more deeply, invalid questions show a weak correlation between the item score and the total score, which indicates that the item is unable to represent the construct of conceptual understanding consistently. In contrast, valid questions, especially those with a high correlation value (e.g., 0.869), indicate that the questions have very good representation power. Thus, only 8 questions were used in the research instrument because they have met the criteria for empirical validity.

Analysis of the level of difficulty was carried out to identify the distribution of the level of difficulty of the questions, so that it can be known whether the instrument is able to accommodate various levels of student ability.

Table 3. Results of the Difficulty Level Test

No	Level K es u k a r a n	Information
1	0.29	Difficult
2	0.31	Currently
3	0.52	Currently
4	0.52	Currently
5	0.67	Currently
6	0.69	Currently
7	0.51	Currently
8	0.68	Currently
9	0.83	Easy
10	0.62	Currently

Based on Table 3, the majority of questions fall into the moderate category, totaling 8. Furthermore, there is one easy item and one difficult item. This distribution indicates that the instrument has a balanced level of difficulty. Medium-level questions serve as the primary measure of student ability, while easy and difficult questions provide the necessary variation in difficulty to avoid measurement bias.

Discriminatory power is an important indicator in determining the quality of questions, because it is related to the ability of questions to differentiate students based on their ability level.

Table 4. Results of Differential Power Test

No	Power Different	Information
1	0.278	Bad

2	0.333	Enough
3	0.278	Very good
4	0.333	Very good
5	0.222	Good
6	0.222	Bad
7	0.611	Enough
8	0.611	Enough
9	0.611	Enough
10	0.333	Good

Based on Table 4, most of the items had discriminatory power in the adequate, good, and excellent categories, indicating that the items were able to differentiate between students with different ability levels. However, two items were categorized as poor, indicating that they were less able to identify differences in student ability. Therefore, these items were eliminated from the final instrument.

Table 5. Conclusion of the Results of the Concept Understanding Test Trial

No.	Validity	Level K es u k a r a n	Power Different	Reliability
1	Invalid	Difficult	Bad	Reliable
2	Valid	Currently	Enough	
3	Valid	Currently	Very good	
4	Valid	Currently	Very good	
5	Valid	Currently	Good	
6	Invalid	Currently	Bad	
7	Valid	Currently	Enough	
8	Valid	Currently	Enough	
9	Valid	Easy	Enough	
10	Valid	Currently	Good	

Based on Table 5, it can be concluded that the instrument used in this study met the criteria for good quality. Of the 10 questions, 8 were deemed suitable for use because they met the criteria for validity, proportional difficulty, and adequate discriminatory power.

3.5. Analysis Gain (N-Gain)

For get a clearer picture accurate about improvement ability understanding draft participant educate , used Normalized Gain (N-Gain) analysis . This analysis aims to measure learning effectiveness by comparing pretest and posttest scores.

Table 7. Average N-Gain Concept Understanding

No	Class	Average N-gain	Criteria
1	Experiment	0.67	Currently
2	Control	0.28	Low

Based on Table 7, it can be seen that the average N-Gain in the experimental class was 0.67, which is in the medium category, while the control class only achieved 0.28, which is in the low category. Analytically, the difference in improvement between the two classes indicates a significant difference in learning effectiveness. The experimental class experienced more

optimal improvement, which indicates that the ALBICI learning model is able to encourage the process of constructing a deeper understanding of concepts. Meanwhile, the low improvement in the control class indicates that conventional learning tends to provide less space for students to actively build understanding. Thus, it can be empirically confirmed that the ALBICI model is more effective in improving understanding of mathematical concepts.

3.5. Normality Test

Before done testing hypothesis , data first formerly tested its normality For ensure that data distribution meets assumptions analysis parametric .

Table 8. Normality Test Results

Variables	Class	Kolmogorov-Smirnov Statistics	df	Sig.	Shapiro-Wilk Statistics	df	Sig.
Understanding Draft	Experiment Pretest	0.099	40	0.200	0.946	40	0.055
Understanding Draft	Experiment Posttest	0.100	40	0.200	0.954	40	0.104
Understanding Draft	Pretest Control	0.127	40	0.103	0.947	40	0.058
Understanding Draft	Posttest Control	0.113	40	0.200	0.946	40	0.056

Based on normality test table , all data in both classes experiment and class control show mark higher significance (Sig.) big of 0.05, both in the Kolmogorov-Smirnov and Shapiro-Wilk tests. Specifically, the significance value in the Shapiro-Wilk test ranges from 0.055 to 0.104, while in the Kolmogorov-Smirnov test it is in the range of 0.103 to 0.200. This indicates that the pretest and posttest data in both classes are normally distributed. Methodologically, these results indicate that there are no significant deviations from the distribution, so that the assumption of normality in the statistical analysis has been met. Thus, the research data is suitable for analysis using parametric statistical tests, such as the t-test, so that the results of the hypothesis testing obtained can be declared valid and have a good level of confidence.

3.5. Homogeneity Test Results (Levene Test)

Apart from normality , a homogeneity test was also carried out . For know whether variance second group own similarities .

Table 9. Results of the Homogeneity Test (Levene Test)

Variables	Calculation Basis	Levene Statistics	df1	df2	Sig.
Understanding Draft	Based on Mean	0.795	3	156	0.499
Understanding Draft	Based on Median	0.811	3	156	0.490
Understanding Draft	Based on Median (Adjusted df)	0.811	3	155,963	0.490
Understanding Draft	Based on Trimmed Mean	0.805	3	156	0.493

Based on Table 9, all significance values (Sig.) in the Levene test, whether based on the mean, median, or trimmed mean, show values greater than 0.05. The significance values range from 0.490 to 0.499. This indicates that the data variance between the experimental and control

groups is homogeneous. Statistically, there is no significant difference in variance between the two groups. By fulfilling this homogeneity assumption, the research data meets one of the important requirements in parametric analysis. Therefore, hypothesis testing can be continued using parametric statistical tests with valid and reliable results.

3.4. Hypothesis Testing

After the assumptions of normality and homogeneity were met, a hypothesis test was then carried out to determine the effect of the ALBICI learning model assisted by handouts on the ability to understand concepts.

Table 10. Hypothesis Test Results (Independent Samples t-Test)

Variables	Assumptions	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Standard Error Difference	Lower	Upper
Understanding Draft	Equal variances assumed	1,453	0.232	7,323	78	0,000	15,500	2,117	11,286	19,714
Understanding Draft	Equal variances not assumed	-	-	7,323	76,923	0,000	15,500	2,117	11,285	19,715

Based on Table 10, the significance value in the Levene test is 0.232 (> 0.05) indicating that the variance of both groups is homogeneous. Therefore, the interpretation of the t-test uses the equal variances assumed row. The results of the t-test show a Sig. (2-tailed) value of 0.000 (< 0.05), which means there is a significant difference between the experimental class and the control class. Thus, H_o is rejected and H_1 is accepted.

Furthermore, the t-value of 7.323 indicates a significant difference between the two groups. The mean difference of 15.500 indicates that the average conceptual understanding ability in the experimental class was higher than that of the control class. The confidence interval (11.286–19.714) that did not cross zero further confirms that the difference is statistically significant. Overall, these results indicate that the ALBICI learning model assisted by handouts has a significant and positive effect on improving students' mathematical conceptual understanding ability compared to conventional learning.

3.5. Discussion

Research result show that application of the ALBICI (*Active Based Learning Interactive Contextual Interaction*) learning model with assistance *handout* give influence significant to ability understanding draft mathematics participant students. This finding is supported by the quality of the research instrument that has gone through a series of feasibility tests, including validity, reliability, difficulty level, and discrimination power. Of the 10 items tested, 8 were declared valid with a reliability coefficient of 0.719, indicating a high level of consistency. This is in line with the principle in quantitative research that valid and reliable instruments are the main basis for producing accurate and reliable data. Thus, the results of this study have a strong level of validity in representing students' conceptual understanding abilities.

Based on the results of data analysis, the increase in conceptual understanding in the experimental class using the ALBICI model assisted by *handouts* was higher than in the control class. This can be seen from the *posttest scores* and *N-gain* , where the experimental class reached the medium category, while the control class was in the low category. Theoretically,

this finding is in line with the constructivism theory which states that knowledge is actively constructed by students through learning experiences. Activity-based learning and active engagement have been shown to improve participants' conceptual understanding (Lestari & Liberna, 2025). In this context, the ALBICI model provides space for students to construct knowledge through meaningful learning activities.

Furthermore, the success of the ALBICI model is inseparable from the interaction and context components in learning. In the *interactive stage* , students actively discuss, exchange ideas, and express opinions, resulting in a process of negotiating meaning that strengthens conceptual understanding. This is supported by research showing that *collaborative learning* and social interaction have a significant contribution to students' cognitive development (Arbeni et al., 2025). Meanwhile, in the *contextual interaction stage* , students relate mathematical concepts to real-life situations. This contextual approach has proven effective in helping students understand abstract concepts in a more concrete and applicable way (Harianja, Yusup, & Siahaan, 2024).

The findings of this study are also consistent with various previous studies showing that context-based learning approaches such as *Contextual Teaching and Learning* (*CTL*) and *Realistic Mathematics Education* (*RME*) can improve students' understanding of mathematical concepts (Tahsinia, Nurhayanti, & Kusmawati 2022). showed that a contextual approach can significantly improve conceptual understanding compared to conventional learning. The similarity between this study and previous studies lies in the use of a student-centered approach (*student-centered learning*). However, this study has a novel contribution through the integration of the ALBICI model with the use of *handouts* as learning media that function as *scaffolding* in helping students understand the material systematically.

Critically, the improvement in conceptual understanding in the experimental class was not only influenced by the learning model, but also by the synergy between the model, media, and learning strategies used. The ALBICI model, which is active, interactive, and contextual, is more optimal with the support of structured *handouts* . This is in line with research findings that the use of appropriate learning media can improve learning effectiveness and student learning outcomes (Putri, Hidayah, & Gusmaneli, 2025). The practical implication of this finding is the importance for educators to design innovative learning, not only focusing on material delivery, but also on active student involvement and the relevance of the material to real life. In learning practice, these findings imply that teachers can use the ALBICI model assisted by handouts as an alternative strategy to strengthen students' mathematical conceptual understanding. Teachers need to design handouts that are concise, systematic, contextual, and aligned with learning indicators, so that students can use them as guides during discussion, exploration, and reflection activities. The implementation of this model also requires teachers to act as facilitators who guide students in asking questions, expressing ideas, comparing answers, and connecting mathematical concepts with real situations. Therefore, mathematics learning in elementary schools should not only emphasize procedural exercises, but also provide opportunities for students to construct concepts actively through interaction and contextual problem solving.

The results of this study also have implications for classroom management and instructional planning. Before applying the ALBICI model, teachers need to prepare learning scenarios that encourage student participation, arrange group discussion activities effectively, and provide contextual questions that match students' cognitive development. Schools can support this practice by encouraging teachers to develop structured teaching materials, including handouts, worksheets, and contextual learning resources. In addition, the findings can be used as a basis for teacher training programs that focus on active, interactive, and

concept-oriented mathematics learning.

However, this study has several limitations. First, the study was conducted in only one school with a limited sample size, thus the generalizability of the results is still limited. Second, the materials used only covered specific topics, namely data and opportunities, so the effectiveness of the ALBICI model on other materials cannot be fully understood. Furthermore, external factors such as learning motivation and students' initial abilities have not been analyzed in depth. Third, this study used a quasi-experimental design, so the researchers could not fully control all variables outside the treatment, such as differences in students' learning habits, classroom atmosphere, parental support, and students' prior learning experiences. Fourth, the measurement of conceptual understanding was mainly based on written test results, so it did not fully describe students' thinking processes during learning activities. These limitations indicate that the findings should be interpreted carefully and should not be generalized to all elementary school contexts without further investigation. Therefore, further research is recommended to test the ALBICI model at various educational levels and with a wider range of materials, as well as combine it with technology-based learning media to obtain more comprehensive results. Future studies are also suggested to involve larger samples, different school characteristics, and additional variables such as motivation, learning independence, mathematical communication, and students' problem-solving ability. Qualitative data, such as classroom observations and student interviews, can also be added to provide a deeper explanation of how the ALBICI model assisted by handouts influences students' conceptual construction process.

With thus, it can concluded that the ALBICI (*Active Based Learning Interactive Contextual Interaction*) learning model is assisted *handout* is alternative effective learning in increase ability understanding draft mathematics participant The strength of this model lies in the integration of activities, interactions, and real-world contexts, which makes learning more meaningful. Theoretically, this research strengthens the constructivist approach to mathematics learning, while practically contributing to the development of innovative learning strategies in elementary schools. Future studies are also suggested to involve larger samples, different school characteristics, and additional variables such as motivation, learning independence, mathematical communication, and students' problem-solving ability. Qualitative data, such as classroom observations and student interviews, can also be added to provide a deeper explanation of how the ALBICI model assisted by handouts influences students' conceptual construction process.

4. CONCLUSION

Based on results research, can concluded that The application of the ALBICI (Active Learning Based Interactive Conceptual Instruction) learning model assisted by handouts has an effect in a way significant to improvement ability understanding draft mathematics participant educate. This is proven through difference results Study between class experiments and classes control, good in a way descriptive through N-Gain value as well in a way inferential through the Independent Sample t-test which shows mark significance not enough of 0.05. Thus, the handout-assisted ALBICI model is proven to be more effective than conventional learning in improving understanding of mathematical concepts.

Theoretically, this research contributes to strengthening the constructivist paradigm in mathematics learning, particularly through the integration of active, interactive, and contextual learning approaches with the use of handouts to support the knowledge construction process. Practically, these findings imply that teachers need to design learning that is not only oriented

toward delivering material but also toward active student involvement and a systematic and contextual presentation of material.

However, this study is limited by its sample size and limited scope. Therefore, further research is recommended to test the ALBICI model in a broader context, both in terms of educational level and material variation, and to integrate it with digital technology-based learning media to obtain more comprehensive results and stronger generalizability.

5. REFERENCE

Albina, Meyniar. 2025. "Experimental Research Models in Education: Types, Objectives, and Applications." *Academic Media Journal (JMA)* 3 (6).

Andriani, S, AP Yani, H Johan, S Sutarno, and D Parlindungan. 2024. "Development of Handouts as Teaching Materials on the Interaction of Living Things with the Environment for Grade VII Junior High School Students." *Diksains: Scientific Journal of Science Education* 5 (1): 42–52. Https://Doi.Org/10.33369/Diksains.5.1.42-52.

Arbeni, Wawan, Astina Windiani, Demak Sariyani Br Sihotang, Nova Anggraini, Siska Wulandari, and Arga Nugroho. 2025. "Test Reliability Analysis in Educational Evaluation: A Quantitative Approach to Consistency and Validity." *Holistic Science* 5 (1): 59–64.

Ariawan, Rezi, Linda Triwira Astuti, Study Program, Mathematics Education, and Riau Islamic University. 2025. "The Effect of Guided Discovery Method on Mathematics Learning Outcomes of Class VIII Students of Smp Pgri Pekanbaru: Nonequivalent Control Group Design, Students of Smp Pgri Pekanbaru, Smp Pgri Pekanbaru" 8 (1): 43–50.

Dahlia, Jismi Mubarak, Septi Dwiyanti. 2024. "The Effect of Contextual Teaching and Learning Model Assisted by Handouts on Student Learning Outcomes on the Food Digestive System Material for Class VIII of Smp Negeri 1 Rambah Samo in the 2023/2024 Academic Year." *Journal of Biology, Chemistry, Mathematics and Physics Education, 1(1): 9-15* Vol. 1 (1): 9–15.

Darmawati, D. 2024. "Analysis of Students' Mathematical Concept Understanding Ability on Fraction Material." *Journal of Mathematics Education* 9 (1): 45–58. Https://Repository.Unja.Ac.Id/63195/1/Skripsi Full Text.Pdf.

Deppong, Anselmus, Jorry Ferry Monoarfa, and Ermita Ermita. 2025. "An Open-Ended Approach in Learning Quadratic Equation Material: An Experimentation on Grade X Students of Sma Negeri 2 Tondano." *Peshum: Journal of Education, Social and Humanities* 4 (3): 3706–16.

Erawati, Dwi Yuliana, Lovika Ardana Riswari, and Fitriyah Amaliyah. 2025. "The Effectiveness of Cibatar Learning Media on Elementary School Students' Understanding of Mathematical Concepts." *Jupika: Journal of Mathematics Education* 8 (1): 64–75.

Fadly, Wijaya. 2022. *Learning Models for the Implementation of the Independent Curriculum* . Bantul: Bening Pustaka.

Falihah, Rafidah Tsaqibah, Nurul Istiqfaroh, and Ulfizah Rohmah. 2024. "Development of Handout Learning Media in Social Sciences Subjects for Grade V Students in the 2024/2025 Academic Year." *Kurnia Jurnal* 1 (4).

Fitriani Neneng, Imaran Erwinto, Muh, Sultan Dhiqfaini Ana. 2025. "Implementation of Take and Give Learning Model Assisted by Handouts to Improve Science Learning Outcomes of Grade IV Students of Tidung State Elementary School." *Scientific Journal of Pgsd Stkip Subang* 11 (September).

Ghaniya, Irel Zamzamni. 2025. "Implementation of Heyzine-Assisted Digital Handouts for Multimedia Departments to Improve Student Learning Outcomes."

Hamzah, Andi Mawaddah, And Jarnawi A Dahlan. 2023. "Trends In International Mathematics And Science Study (TIMSS) As A Measurement For Student S' Mathematics Assessment

Development Trends In International Mathematics And Science Study (TIMSS) As A Measurement For Student Mathematics Assessment Development," 189–96.

Harianja, M Rokhati, Muhamad Yusup, and Sardianto Markos Siahaan. 2024. "N-Gain Test on the Effectiveness of Using Games with Sgq Strategy to Improve Computational Thinking in Energy Literacy." *Jurnal Intelektualita: Keislaman, Sosial Dan Sains* 13 (2): 303–10.

Lestari, Witri, and Hawa Liberna. 2025. "Implementation of Learning with the "5e" Constructivism Approach to Improve Students' Mathematical Concept Understanding." *National Panel Discussion on Mathematics Education* 11.

Lintang, Queendira, and Atin Nur Widayati. 2025. "Implementation of the Albici Model to Improve Critical Thinking in Economics Lessons of the Independent Curriculum Based on the Deep Learning Approach at Sma Islam 1 Surakarta" 4 (November).

Muslimah, Dina Nur, Mujiyem Sapti, and Puji Nugraheni. 2024. "Experimentation of the Albici Learning Model (Active Learning Based Interactive Conceptual Instruction) Assisted by Quizizz on Learning Motivation and Numeracy Skills of Class XI Students of State Vocational School 1 Kalikajar." *Journal of Integrative Education* 5 (3): 89–100.

Muslimah, Z, MM Afriyadi, and F Farida. 2025. "The Effect of the Auditory Intellectually Repetition Learning Model Assisted by Question Cards on the Understanding of Indonesian Language Concepts in Grade IV." *Indonesian Journal of Education and Learning (Jppi)* 5 (3): 1218–30.

Noviana, Ilva Ira, Syofnidah Ifrianti, and Nur Asiah. 2025. "Analysis of Problem Based Learning Model in Increasing Interest in Learning Indonesian Language in Grade IV Elementary School Students." *Terampil: Journal of Elementary Education and Learning* 12 (1): 42–62.

Son, Alfa Satya, Jason W Morphew, And Li Tan. 2023. "By The Numbers: A Review Of Quantitative Research Methods In Journal Of Engineering Education From 2012 To 2022 Bt - Asee Annual Conference & Exposition, 2023." Baltimore, Maryland: Asee Conferences. https://Doi.Org/10.18260/1-2--43097.

Putri, Rahmi, Marwah Hidayah, and Gusmaneli Gusmaneli. 2025. "Implementation of Collaborative-Based Active Learning Model to Improve Students' Conceptual Understanding." *Journal of Islamic Religious Management and Education* 3 (6): 25–34.

Saputro, ARI Wicaksono. 2025. "The Effect of Contextual Learning Model Implementation on Fraction Concept Understanding in Grade IV Students of Nurul Qur'an Elementary School." Sultan Agung Islamic University Semarang.

Subhaktiyasa, Putu Gede, And Et Al. 2025. "Application of Descriptive Statistics: Quantitative and Qualitative Perspectives." *Emasains: Journal of Mathematics and Science Education* 14 (1): 96–104.

Suhirman, Lalu, Loso Judijanto, Iman Jujur Mendrofa, Amirah Amirah, And Ismadi Ismadi. 2025. *Learning & Teaching: Complete with Models, Strategies, Approaches and Learning Methods* . Pt. Sonpedia Publishing Indonesia.

Tahsinia, Jurnal, Hani Nurhayanti, and Ranti Kusmawati. 2022. "Realistic Mathematics Education Model in Improving Understanding of Mathematical Concepts in Fraction Material" 3 (2): 156–66.

Tiana, Elma Tiana Elma, Risdiana Andika Fatmawati, and Elvani Hertati. 2025. "The Influence of Interactive Learning Media on Pancasila Education Learning Outcomes of Class V of Sd Negeri 6 Sungai Raya." *Uniga Education Journal* 19 (2): 322–37.

Zayrin, Afifah Aulia. 2025. "Analysis of Educational Research Instruments (Validity and Reliability Test of Research Instruments)." *Qosim: Journal of Social & Humanities Education* 3 (2): 780–89.