INSECTA **Vol. 4 No. 2, 2023, pp. 231 - 245**

Available online at
INSECTA
Integrative Science Education and Teaching Activity Journal
Journal homepage : https://jurnal.iainponorogo.ac.id/index.php/insecta

Article

Application of The Inquiry Based ICARE Learning Model Toward Cognitive Learning Outcomes on Salt Hydrolysis Material

Sakina Elok Sabila Fatkhi[1*], Mar'attus Solihah[2]

[1,2]UIN Walisongo Semarang, Indonesia

[*]*Corresponding Address : sakinaeloksabilafatkhi@gmail.com*

Article Info

Article history:
Received:September 23, 2023
Accepted: October 18, 2023
Published:November 30, 2023

Keywords:

ICARE learning models;
Inquiry approach;
Cognitive learning outcomes;
Salt hydrolysis;

ABSTRACT

The implementation of chemistry learning that is teacher centered and the lessons are in the last hour making students lack concentrated so that it is difficult to understand the material delivered by the teacher, one of which is salt hydrolysis. This makes the test results of many students who have not reached the minimum completeness criteria (KKM) of the school is 70. Therefore, the purpose of this study is to find out differences in cognitive learning outcomes between students SMA N 01 Godong who used the inquiry-based ICARE model and the conventional model on salt hydrolysis material after being controlled by initial abilitiy (pre test). This study used a randomized pretest-posttest control group design and cluster random sampling. Data collection techniques using tests, and interviews. The research data were analyzed using covariance analysis (anakova). Based on the results of the study, it was found that there were differences in cognitive learning outcomes that significant between the application of the inquiry-based ICARE learning model with conventional models after controlling the initial ability (pre-test) indicated from the sig value. 0.000. The value is smaller from 0.05 so that Ha of the study was accepted. The results can be concluded that the inquiry-based ICARE learning model can be used to make students' cognitive learning outcomes better than conventional learning models.

INTRODUCTION

Learning outcomes in the realm of cognitive are human behaviors that are centered on the cognitive domain. Realm cognitive has the most important and main role because it is a large part of the learning process that involves thinking activities. Therefore, cognitive aspects are often used as a highlight in assessing country's educational progress (Sari & Wulandari, 2020).

In 2018, an international student assessment program was carried out that captured cognitive skills to apply knowledge to new contexts and map the ability to process data or information. The student assessment was initiated by the OECD called PISA (Program for International Student Assessment). Aspects that PISA assessment includes are reading, mathematics and science (Puspendik, 2019).

The results of PISA 2018 show that Indonesia is ranked 72 out of 78 countries with the average score of reading skills is 371, the math score is 379, and the science field is 396, the score is that's below the international average of 487 for reading skills and 489 average standards of mathematics and science (OECD, 2019). Average PISA scores that being in the low category shows that the learning outcomes of the cognitive domain of Indonesian students are not enough internationally satisfactory. This is because the questions used by PISA are *Higher Order Thinking Skills* (HOTS) based so the include six levels cognitive aspects, while Indonesian students are only able to reach the cognitive level C1-C3 (Aida et al., 2017). The statement can be concluded that the cognitive abilities of students in the area are classified as low levels.

In line with the results of PISA Indonesia in 2018, the results of the Computer-Based National Assessment (ANBK) assessment in 2022, especially the assessment of literacy skills at the Senior High School (SMA) level throughout Indonesia showed unsatisfactory results. The average ANBK data in the literacy sector in 2022 was 49.26% and the assessment results in 2021 were 53.85%. Based on these two data, in 2022 the average result of ANBK in the literacy sector decreased by 4.59 (Kemendikbud, 2022). Literacy skill such as information literacy that include understanding and using different types of texts in solving problems are essential for learners in the environment (Sun et al., 2022). Literacy ability as a basis for knowledge, development of critical thinking and analytical skills to provide competitiveness in the era of technology and globalization. Therefore, the Indonesian education government must improve the quality of education.

Krisna et al., (2020) improved the quality of education in Indonesia so that it can be better through the emphasis on learning is on aspects of literacy, strengthening character education, and the ability to think high level. Therefore, the Indonesian government is changing the education system by suggesting and demanding that teachers carry out learning strategies that train learners in their cognitive abilities. The characteristic of this learning is that independent students actively seek knowledge. A teacher only serves as a facilitator in learning (Annuru et al., 2017).

The government demands student-centered learning but in reality, the learning that makes students active in the classroom has not been implemented. This is evidenced by the results of pre-research researcher interviews with students and teachers of chemistry class XI MIPA at SMA N 01 Godong. Results of interviews show that the process of teaching in the classroom still uses traditional methods because teachers have difficulty matching the right learning model in chemistry learning. Chemistry teacher at SMA N 01 Godong realizes that the way of teaching is still not creative to create student involvement active in learning. Teacher-centered learning results in sleepy students and a lack of focus when the learning process and chemistry learning at the school are in the last hour based on school time. Lack of focus in these learning activities results in students having culty in understanding chemistry subject matter so that learning outcomes during semester tests odd chemistry subjects class XI MIPA get a score below the Minimum Completeness Criteria (KKM) as much as 60%.

Chemistry learning materials such as salt hydrolysis are considered difficult by class XI MIPA students. This statement is shown from the daily test value of salt hydrolysis material in the school year previously, as many as 65% of students scored below the Minimum Completeness Criteria (KKM) schools 70 and the remaining 35% of students get scores exceeding the set KKM school. The chemistry teacher explained that learners find it difficult to make hydrolysis reactions, calculate the pH of a salt solution, and determine the acid-base properties of salt.

One of the efforts to overcome the problems that have been described is to innovate the atmosphere of the teaching and learning process. Learning innovations that can be used to

solve problems at the research location is to apply the ICARE learning model. The ICARE model consists of five main stages I (introduction), C (connection), A (apply), R (reflect), and E (extend). The ICARE model is Learning activities that prioritize understanding concepts and applying participants' knowledge educate (Carni et al., 2017). The ICARE learning model has the characteristic of providing opportunities for students to apply their knowledge (Eliyawati, 2017). Learning model ICARE which consists of five stages is needed for learning outcomes, especially the cognitive domain to be better (Nyoman et al., 2021). The stages of the ICARE connection model can make students interested and active Building one's knowledge through teachers provides stimulation so that it can form abilities thinking to remember (C1) and understand (C2). The teacher application stage provides opportunities for students to apply their knowledge, to make improved thinking such as applying (C3), analyzing (C4), evaluating (C5), and creating (C6).

ICARE is more optimal when integrated with an inquiry approach to be applied to the process of chemistry learning. This is because the ICARE model has the advantage that the learning atmosphere is oriented to students and the content structure in learning is said to be balanced between theory and practice (Azizah et al., 2022). The learning process with the ICARE model to train students' cognitive abilities will be optimal if integrated with an inquiry approach. The reason is that the inquiry approach has the aim of training students in structured, rational, creative, and evaluative thinking skills, or improving higher-order thinking skills (Yun et al., 2023). The inquiry approach is part of the process integrate the cognitive aspects of learners in obtaining information through independent discovery. Independent discovery activities train the development of students' thought processes so that they can improve learning outcomes (Ardiawan, 2019). The inquiry approach supports an interactive atmosphere of syntax ICARE learning model such as connection, application, reflection, and extension so that create researchers to integrate the ICARE learning model with an inquiry approach to make a characteristic in this research and have a contribution to the science of education. Some of the advantages that the model has are to distinguish it from other learning models and the learning outcomes of students in the school. Researchers formulate the problem of whether there are differences in cognitive learning outcomes of SMA N 01 Godong students between those who use inquiry-based ICARE models and conventional models on salt hydrolysis material after being controlled by initial abilities (pre-test).

The above explanation is the background to the formation of the purpose of this research study, namely to find out differences in cognitive learning outcomes of SMA N 01 Godong students between those who use the model ICARE is inquiry-based with conventional models on salt hydrolysis material after being controlled by initial ability (pre-test). Researchers hope that the results of the research can be useful for teachers, students in SMA N 01 Godong, and dear readers.

METHODS

The type of research used in this study is quantitative quasi-experimental design. In this study, researchers used a form of randomized pre-test post-test control group design. Randomized pre-test post-test control group design is a design that uses two groups and the selection is selected based on random assignment and pre-test on the design will participate in calculation analysis because it has the status of a covariate (Kadir, 2015). The design form of the randomized pre-test post test control group design is as follows.

Table 1. Randomized Pre-test Post-test Control Group Design

	Class	***Pre-test***	***Treatment***	***Post-test***
R	Eksperimental	X_e	A_e	Y_e
R	Control	X_k	A_k	Y_k

Details :

X_e : Pretest the experimental class before the application of the Inquiry-based ICARE model.
A_e : Application of the Inquiry-based ICARE model.
A_k : No treatment.
Y_e : *Postest* experimental class after the application of the Inquiry-based ICARE model.
X_k : *Pretest* control class
Y_k : *Postest* control class.
R : *Random Assignment*

The sampling for this research study was cluster random sampling. Cluster random sampling is a determination of samples that use clusters or collections of population elements (Sugiyono, 2019). The sample of the study was randomly taken from the population that had formed a cluster, namely class XI MIPA 1-6 in SMA N 01 Godong. The sampling results were obtained by class XI MIPA 01 which was 36 students as a control class. Class XI MIPA 02 which has 35 students is an experimental class.

Data collection techniques use tests and interviews. Data processing techniques use covariance analysis. The test instrumen in this study used multiple choice. The tests are of two types, namely pre-test and post-test. Research data from pre-test and post-test values were analyzed using covariance analysis (Ancova). Technique Ancova is a combination of variance analysis and linear regression correlation. Ancova test is used to pay attention to the presence or absence of a significant influence between the independent variable and the dependent in the presence of covariate variables. The Ancova test has a prerequisite analysis in statistics. Test analysis the pre-requisites of Ancova are normality, homogeneity, heteroscedasticity test, linearity test, and direction meaningfulness regression (Payadnya & Jayantika, 2018).

RESULTS AND DISCUSSION

This research has been conducted in March 2023 at SMA N 01 Godong. Application of learning the inquiry-based ICARE models is implemented in the experimental class. The control class implement the application of conventional learning models. The conventional model is interpreted as a frequent learning model applied by the chemistry teacher of SMA N 01 Godong, namely lectures. This study used pre-test and post-test to retrieve data. Pre-test activities are used for data collection before treatment and post-test is used for data collection after treatment. Pre-test and post-test data were analyzed using SPSS version 24.0. The number of students who achieved minimum grades or the maximum during the pre-test and post-test of the experimental and control classes can be known based on frequency distribution analysis presented in the form of a histogram and shown in Figure 1-4.

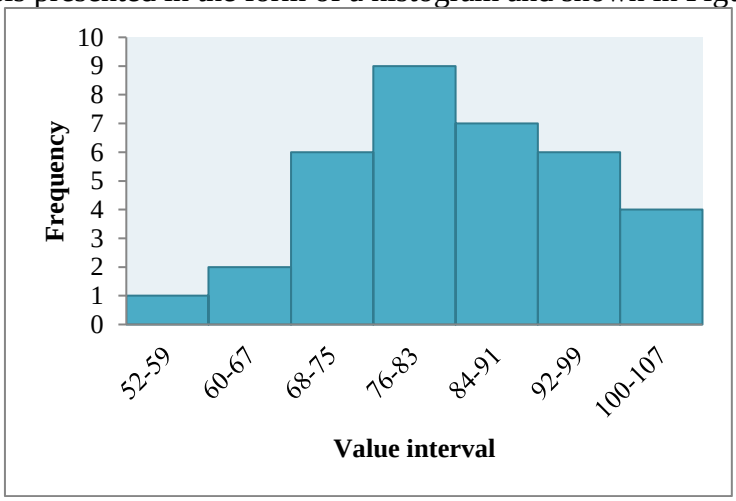


Figure 1. Histogram of Experimental Class Post-Test Result

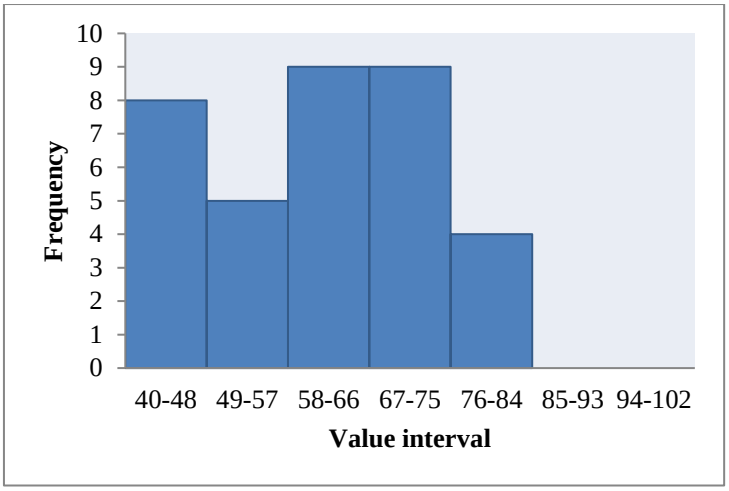


Figure 2. Histogram of Experimental Class Pre-Test Result

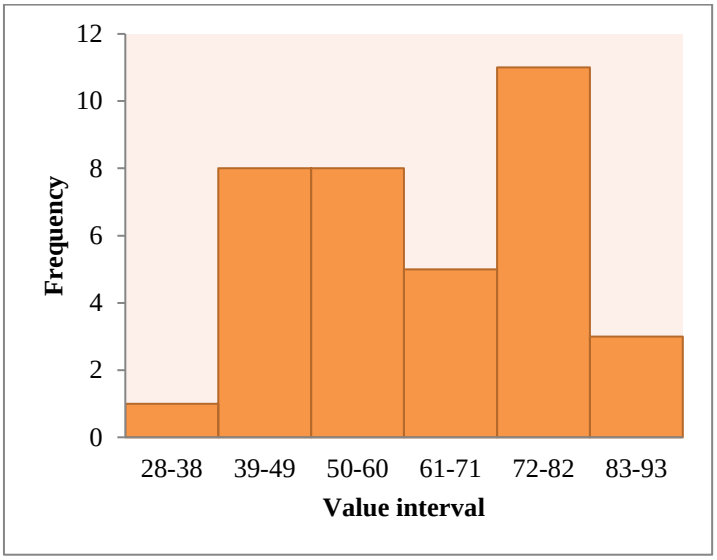


Figure 3. Histogram of Control Class Post-Test Result

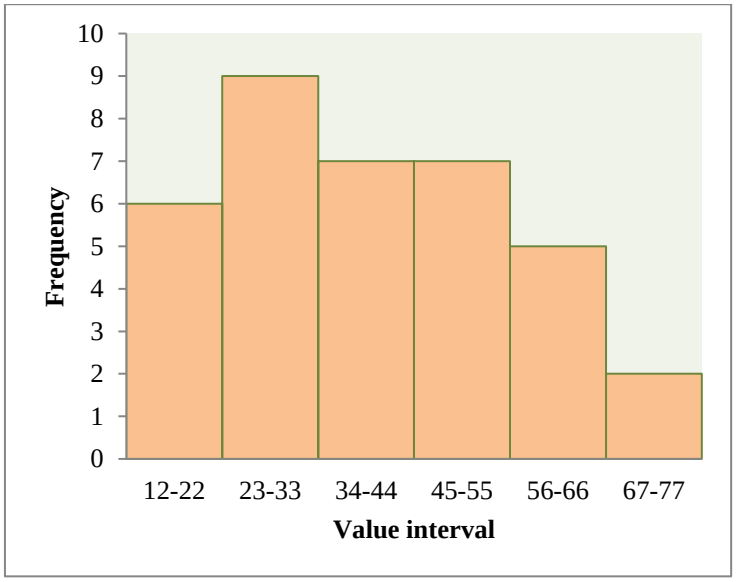


Figure 4. Histogram of Control Class Pre-Test Result

Based on the results of the control class post test histogram in Figure 3 shows information that the distribution of this research data tends to be symmetrical. This indicates

that the median, mean and mode values are worth the same. Another information that can be conveyed from the histogram is that the highest post-test value is obtained learners in the value range 83-93 and grades often appear located in the interval 72-82. Histogram data the results of the control class pre-test in Figure 4 show information that the distribution of data in this study tends to be symmetrical. This indicates that the median, mean and mode values are equal. Other information what can be conveyed from the histogram is the highest pre-test score obtained by students on the interval 67-77 and the frequently appearing values are located in the interval 23-33.

Based on the results of the experimental class post-test histogram in Figure 1 provides information that the distribution of this research data tends to be symmetrical. This indicates that the median, mean and mode values are worth the same. Other information that can be conveyed from the histogram is the highest post-test value acquired by learners at intervals of 100-107. Histogram data of experimental class pre-test results in Figure 2 shows information that the distribution of data in this study tends to be symmetrical. This indicates that the median, mean and mode values are equal. Other information that can be conveyed from the histogram is the highest pre-test scores are obtained by students at intervals of 76-84.

Post-test values that are above KKM in the experimental class are more than the control class. This is shown by the large number of children who passed KKM in the experimental class as many as 32 while the control class was 14. The data is shown in Figure 5. The number of participants who passed the KKM if made a percentage showed as much as 70% for the experimental class and 30% for the control class. The percentage result is presented in Figure 6.

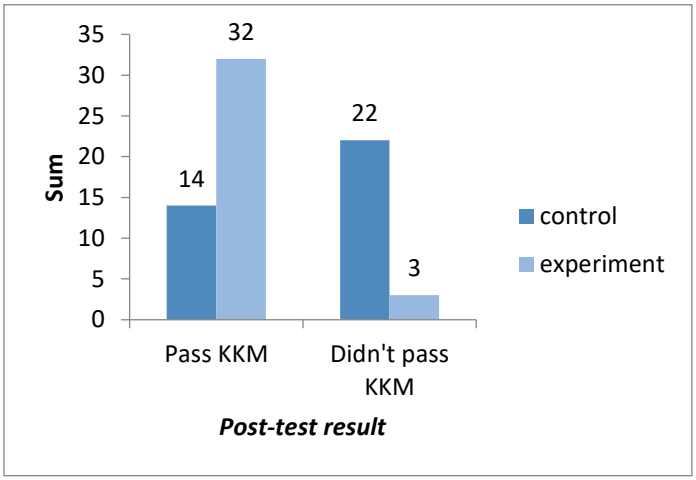


Figure 5. Control and Experiment Class Post-Test Value Bar Chart

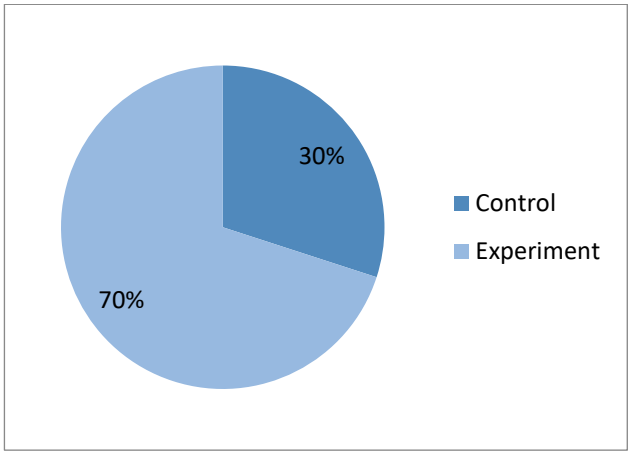


Figure 6. Percentage of Post-Test Scores Passing KKM in Two Classes

This study aims to determine the differences in cognitive learning outcomes between SMA N 01 Godong which uses the ICARE model (Introduction, Connection, Application, Reflection, Extension) based inquiry with conventional models on salt hydrolysis material after control by initial ability (pre-test). Research study data analysis techniques using Ancova to be able to answer the purpose of the study. Ancova analysis has several pre-requisite tests, namely normality test, homogeneity, heteroscedasticity test, linearity test, and meaningfulness of regression direction through the help of SPSS version 24.0.

The results of the pre-requisite test analysis for the normality test using kolmogorov smirnov expressed data the study was normally distributed. The homogeneity test using levene stated that the data of this study was homogeneous. The results of the heteroscedasticity test of regressed research data did not occur inequality of variation from the residual of one observation to another. The results of the linearity test and the meaningfulness of the regression direction are stated there is a relationship between the independent variable with bound not equal to zero shown in the line Sig value linearity and regression direction are linear as indicated in the Sig value line deviation from linearity. The results of the prerequisite analysis test are shown in Tables 2, 3, 4 and 5.

Table 2. Result of Normality of Pre-Test and Post-Test Data

Variable	Class	Statistics	df	Sig.
Pre -Test	Control	,089	36	,200
	Exsperiment	,147	35	,052
Post-Test	Control	,126	36	,159
	Exsperiment	,121	35	,200

Table 3. Result of Homogeneity *Pre-Test* and *Post-Test*

Variable	***Levene* Stat**	df	Sig.	Sig. level
Pre -Test	3,610	69	,062	0,05
Post- Test	3,957	69	,051	0,05

Table 4. Result of Glejser Heteroscedasticity Test

Dependen Variable	Variable	t	Sig.
AbsRes	(Constant)	6,376	,000
	Learning model	-,532	,596
	Pre Test	-1,807	,075

Table 5. Result Linearity Test and Direction Meaningfulness Regression

Variable	Details	F	Sig
*Pre-test * Post-test*	*Linearity*	12,415	,001
	Deviation from Linearity	0,506	,938

Table 6. Result Ancova test

Details	Type I Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6530,887	2	3265,443	16,654	,000
Pre-test	3377,155	1	3377,155	17,224	,000
Model	3153,731	1	3153,731	16,084	,000

R Squared = ,329 (Adjusted R Squared = ,309)

The data of this research study was declared to have passed the prerequisite test provisions before hypothesis analysis, namely Ancova. Based on the results of the hypothesis test, it can be seen that the significance value for the learning model is 0.000 because the value is less than 0.05 so it can be stated that there is a difference in cognitive learning outcomes students based on the treatment of the ICARE learning model based on an inquiry approach and conventional after controlling the ability initial (pre-test) of students. How to

control abilities the beginning is through statistical control or statistical approach, namely covariance analysis.

The influence of the difference in learning models in achieving learning outcomes can be seen from the value of R square which is listed in Table 6. The value of R square shows 0.329 or in percent form of 32.9% The achievement of cognitive learning outcomes of students is influenced by the learning model and the remaining 67.1% is influenced by other variables outside of this study presented in Figure 7. Review of this research applying two learning models, namely inquiry-based ICARE and conventional models. Analysis results through Ancova are stated in Table 6.

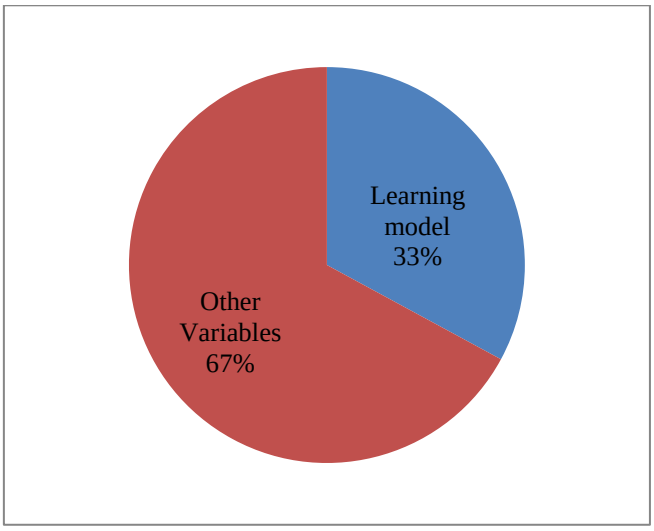


Figure 7. The Value of The R Square Learning Model on Learning Outcomes

This study examines the application of the ICARE learning model based on the approach of Inquiry. The ICARE model consists of five syntaxes, namely introduction, connection, application, reflection, and extension. The inquiry approach begins with an orientation, formulating problems, hypotheses, collecting data, testing hypotheses, as well as formulating conclusions. Forms of integration of stages of the ICARE learning model Inquiry-based inquiry is presented in Table 7.

Table 7. Learning Stages of Experimental Classes

Syntax ICARE Model	**Inquiry Approach**
Syntax 1: *Introduction*	Orientation
Syntax 2: *Connection*	Formulate a problem Formulating hypotheses
Syntax 3: *Application*	Collecting data Testing hypotheses
Syntax 4: *Reflection*	Formulate conclusions
Syntax 5: *Extension*	Collecting data

The learning process of experimental classes using the ICARE model with an inquiry learning approach. The initial stage of the ICARE model is **introduction** syantax explaining the learning and targets that will be during learning (Carni et al., 2017). Syntax: introduction of this study, class XI MIPA 02 students were given perceptions and direction regarding the objectives and benefits of learning. This stage of apperception has the aim of attracting the attention and focus of students. This stage the teacher conditions the class so that students are ready to follow the learning. The first syntax of the ICARE model is the introduction of teachers doing apperception before learning begins. Apperception activities can create

responsive learning conditions so that these activities are visible steps of the inquiry learning approach, namely orientation. The orientation stage of the inquiry approach explains the teacher preparing students to be ready and open to learning by exploring (Haidar et al., 2020).

The second stage of the ICARE model, namely the **connection** syantax, explains the planting of learning concepts that are connected from previous knowledge with knowledge to be learned through a stimulus that displays examples in the context of life (Rayanto & Supriyo, 2022). The connection syntax of this research is that class XI MIPA 02 students are given problem stimuli regarding daily life events related to old and new material. The initial meeting of stimuli was in the form of questions about examples of acids and bases that were reacted to form new compounds and then students were invited to find out if the new compounds were called salt compounds and identify if the compounds were dissolved in water whether the ions decomposed and tended to form acids/bases of origin.

The next meeting stimuli learners are asked questions about examples of compounds salt when tested red or blue litmus paper changes color, then students estimate the properties of the solution of such salt compounds. The next meeting of learners gets stimuli questions about examples of salt compounds such as acid salts, base salts, and neutral salts then participants determine whether salt compounds can be hydrolyzed or not through the magnitude of each pH value. This makes class XI MIPA 02 students aroused to think and a guess arises the answer to that problem. This research stimulation activity can be seen in the steps of the inquiry learning approach, namely formulating problems and hypotheses. This stage is successful to make the learning atmosphere active and the curiosity of class XI MIPA 02 students is high towards the knowledge of the material studied. This statement is in line with Piaget's theory that cognitive knowledge will develop if sought and found by learners themselves (Saragih et al., 2021).

The third stage of the ICARE model, namely the **application** syntax, explains the application of material concepts that have been learned through the connection stage (Putu, Dewi, Ardana, 2019). This third syntax can be applied to practicum activities or discussions in solving problems (Carni, Maknun, 2017). The application stage in this study shows the step of the inquiry approach to collecting data and testing hypotheses, this can be seen when class XI MIPA 02 students create groups to discuss the validity of the results of alleged problem answers by collecting theoretical data from various learning sources such as books, handouts, modules, and the internet. These data have been obtained by learners. The time comes for students to be invited to carry out practicum to test hypotheses. Phase these students are emphasized to be able to apply the knowledge that has been gained through activities discussion and two practicums. The implementation of these two practicums uses simple materials and tools that exist in the surrounding life. The reason for carrying out practicum is simply because of the limited tools and chemicals in school laboratories that support salt hydrolysis material experiments, so researchers use simple materials and tools that are easily found in the surrounding environment. Current researcher researched school laboratory rooms while being converted into learning rooms in class XI MIPA 06 due to the lack of availability of classrooms so the implementation of practicum for classes the experiment was in classroom XI MIPA 02.

The first practicum was on determining the properties of salt solutions based on acids and bases with litmus paper. The first practicum activity used materials such as ZA fertilizer, table salt, soda cakes, water, and litmus paper (red and blue). The experimental tools used were 4 plastic cups, and 4 plastic spoons. This activity students are very enthusiastic when carrying out practicum. The statement is evidenced by practicum observations which state that discipline, and seriousness when preparing tools and materials and conducting practicum with their respective team members. The result practicum that has been carried out by class XI MIPA 02 students is shown in Figures 8 and 9.

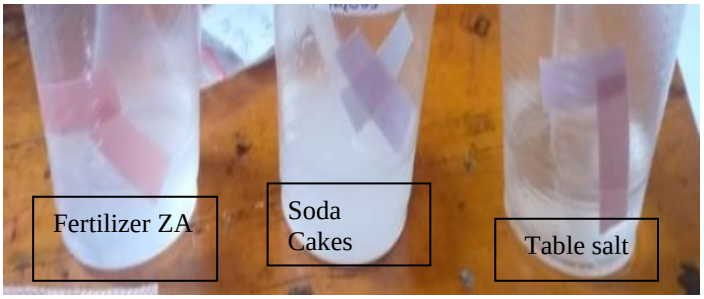


Figure 8. Result of Practicum Determination of Salt Solution Properties

E. Tabel dan hasil pengamatan

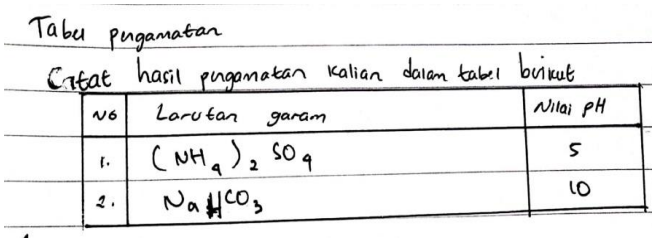
Larutan sampel	Perubahan warna lakmus		Sifat larutan garam
	Merah	Biru	
Garam Dapur NaCl	Merah	Biru	Netral
Pupuk ZA $(NH_4)_2SO_4$	Merah → merah	Biru → merah	Asam
Soda kue $NaHCO_3$	Merah → Biru	Biru → Biru	Basa

Figure 9. Result of Observations Determination of Salt Solutions

Based on data from student observations of saline solution $(NH_4)_2SO_4$ using litmus paper shows that the color change occurs from blue litmus to red which indicates the nature of acid from such salts. $NaHCO_3$ salt solution also undergoes discoloration from red litmus becomes blue which indicates the alkaline nature of the salt. NaCl salt solution does not change color on litmus paper, this indicating the neutral nature of the salt. Based on the data from the practicum results, it can be concluded that students have succeeded in identifying the properties of salt in salt solution and presenting the experimental results accurately.

The second practicum is about determining the pH of hydrolyzed salt solutions with the help of pH paper universal. This practicum activity uses materials such as ZA fertilizer, soda cakes, water, and pH paper universal. The experimental tools used are 2 plastic cups and 2 plastic spoons. Practicum activities the second is that students have an attitude of discipline, and seriousness when preparing tools and materials, and doing practicum with a group team is better than before and looks compact. The result practicum that has been carried out by class XI MIPA 2 students is shown in Figures 10 and 11.

Figure 10. Practicum Results pH Determination of Salt Solutions with Universal pH Paper



Tabel pengamatan

Catat hasil pengamatan kalian dalam tabel berikut

No	Larutan garam	Nilai pH
1.	$(NH_4)_2SO_4$	5
2.	$NaHCO_3$	10

Figure 11. Results of Practicum Observation pH Determinaion of Salt Solutions with Universal pH Paper

Based on the data from the observations above, it can be said that students have succeeded in correctly performing and reporting the pH value of salt solutions based on acid-base properties. Thing this is shown by the results of students' answers to the pH value of the salt solution $(NH_4)_2SO_4$ of 5 and solution $NaHCO_3$ salt of 10. The results of the experiment conducted are by the theory of Utami et al., (2009) which states that a pH value of < 7 indicates an acidic salt solution, and a pH value of >7 indicates a solution Salt is alkaline.

Practicum activities carried out in the third stage of this study can make involvement between students who are active and enthusiastic in learning to answer the problems that have been formulated in the previous stage. This statement is in line with Jerome Bruner's theory that participants educate it would be nice to learn through active participation to gain learning experience and carry out a scientific process to find an understanding of knowledge about matter independently (Yuberti, 2014). The implementation of practicum in groups makes students indirectly each other explore information, ask questions, and make forecasts. This is what makes participants learners easily understand the material to successfully prove the harmony between scientific results and learning materials. This activity is in line with Vygotsky's theory that knowledge and the thoughts that learners have developed through the process of interaction relationships with others (Ibrohim et al., 2021).

The fourth stage of the ICARE model, namely the **reflection** syntax, explains that students can conclude and express the results of understanding the learning material that has been given (Suartama et al., 2022). This research study at the reflection stage carried out presentation activities so that each group was asked to make a presentation related to the results of practicum discussions that had been carried out by each group. Presentation activities from the results of data from several groups led students to draw conclusions about the material given. The reflection stage in this study shows the steps of the inquiry approach to formulating conclusions, this can be seen when students explain the data of practicum results and the process during questions and answers in presentation activities so that the information obtained from these activities encourages students to find valid and realistic conclusions.

This research review in the fourth stage carried out presentation activities so each group was asked to make presentations related to the results of their respective group discussions. Presentation activities are carried out three times. During the presentation activity the aspects observed are the use of body gestures when carrying out presentations, the way students carry out presentations, the use of language, the accuracy of intonation and clarity of articulation, and the last aspect of the ability to maintain and respond. Based on the results of observations during the presentation activity, show that students experience positive progress when carrying out presentations at each meeting. This indicates students always conduct self-evaluation independently so that in the next learning students make developments to come up with the best version. The progress of the student is in line with the theory of Vygotsky who said that the learning process will be effective, efficient, and optimal when learners learn collaboratively with classmates and the role of the teacher is only as a supporter or companion (Herliani et al., 2021).

The fifth stage of the ICARE model is the **extension** syntax. This stage students are given the task of finding reading literacy or other sources related to the material learned and

can practice questions such as enrichment. The extension stage aims to broaden horizons so that students can be open to other ideas (Carni et al., 2017). This research study provides the task of summarizing and practicing questions at the end of learning by the teacher. The activity aims to mature students' understanding of the material that has been learned. The extension stage in this study looks at the inquiry approach step in collecting data, this can be seen when students do the task of summarizing from several books borrowed from the library and the task of answering practice questions by looking for answers from reading sources through books from libraries and the internet.

Based on the presentation of the five steps, the ICARE model directs learners to gain complete insights. The results of the study by applying the ICARE model students get a comprehensive learning experience starting with a syntax introduction that attracts the focus of students, then a syntax connection that introduces a concept, a syntax application that applies a concept, then syntax reflection that concludes the understanding of concepts that have been formed from the results of their discoveries in the learning process to syntax extensions that expand the understanding of concepts that have been formed. This research study ICARE model is based on an inquiry approach that has the advantages of open-ended topics and opportunities for discovery, so that students are actively involved in thinking in a structured, creative and evaluative manner, so that the findings obtained in the implementation of the ICARE model are based on an inquiry approach, first students can construct knowledge and skills in problem solving. Second, make learners active thinkers who are directly involved and not passive observers, thus creating a meaningful learning process. Third, students are motivated and interested when participating in learning. These four learnings make the knowledge that has been learned remain embedded in the minds of students. The results of these findings have relevance to the research of Kurniawan et al., (2018) which revealed that the presence of factors within themselves such as interests, motivations, habits and external factors such as teachers, learning situations will make learning outcomes more optimal.

The application of the ICARE learning model based on the inquiry approach has positive progress and has an impact on the cognitive learning outcomes of students. This is shown from the significance value of the learning model line after controlling for the initial ability (pre test) of 0.000 in the results of the anacova analysis. The value indicates less than 0.05. Based on these data, it shows that the treatment of the ICARE learning model based on an inquiry approach can make a difference to the cognitive learning outcomes of students better.

Cognitive learning outcomes of students can be better with the ICARE model because there is a development of the six processes of cognitive levels of students when the five syntax of the model is applied. The first syntax of the introduction has not seen the cognitive process because this syntax only attracts the focus of students to be ready to receive learning. The cognitive process of students is formed starting from the second stage, namely connection, to the fifth stage of extension. The connection stage that introduces a new concept that is associated with the previous concept through stimuli makes students actively build knowledge so that they can form the ability to think, remember (C1) and understand (C2). The application stage that applies concepts through discussion and practicum activities makes students apply their knowledge, thus training thinking skills such as applying (C3), and analyzing (C4). The reflection stage that concludes the understanding of concepts that have been formed from the results of one's own discoveries in the learning process of presentation activities can train the ability to think, analyze (C4) and evaluate (C5). The extension stage expands the understanding of concepts that have been formed through the task of finding source literacy related to the material studied and then recording important information and through practice questions that are given freedom in finding data to answer

the question will train thinking skills in analyzing (C4), evaluating (C5) and creating (C6). Cognitive methods can be formed when students analyze the content of reading literacy from selected sources and then evaluate important information points and then these information points are created in making summaries in students' personal books. Some reviews of the findings above, researchers can conclude that the ICARE learning model based on the inquiry approach can train cognitive processes in students so that cognitive learning outcomes become better than learning models that only train how to think, remember, and apply.

CONCLUSION

Based on the results of research conducted at SMA N 01 Godong, it can be concluded that once controlled by initial ability, there were significant differences in cognitive learning outcomes between the application of inquiry-based ICARE learning model with the application of conventional models seen from a significant value of 0.000 through ancova analysis. Significance value of less than 0.05 then the final hypothesis (Ha) of the study is accepted. The results of the study stated that the ICARE learning model Inquiry-based makes students interested, motivated, and active thinkers who are involved direct and have more meaningful, and fun learning so that it can be applied to making cognitive learning outcomes more optimal compared to conventional models.

This study has limitations and shortcomings such as only focusing on measuring cognitive learning outcomes for students through the application of an inquiry-based ICARE learning model in salt hydrolysis material so that it can be developed in future research with different variables and activities simple practicum implementation at the application stage which is integrated into the data collection stage and test the hypothesis of the inquiry approach when viewed in terms of smaller accuracy values compared to using laboratory equipment so it is recommended for future researchers using chemicals and laboratory equipment.

AKNOWLEDGMENT

This opportunity the researcher begs permission to express his gratitude that in the absence of help, support, as well as guidance from all parties involved in the research and preparation of this scientific study will not be resolved.

REFERENCES

Aida, N., Kusaeri, & Hamdani, A. S. (2017). Karakteristik Instrumen Penilaian Hasil Belajar Matematika Ranah Kognitif yang Dikembangkan Mengacu pada Model Pisa. *Suska Journal of Mathematics Education*, *3*(2), 130–139.

Annuru, T. A., Johan, R. C., & Ali, M. (2017). Peningkatan Kemampuan Berpikir Tingkat Tinggi Dalam Pelajaran IPA Peserta Didik SD Melalui Model Pembelajaran Treffinger. *EDUTCEHNOLOGIA*, *3*(2).

Ardiawan, I. . K. . (2019). Implementasi Pendekatan Inquiry Terbimbing dalam Upaya Meningkatkan Hasil Belajar IPA Pada Siswa SD. *Tantangan Dan Peluang Dunia Pendidikan*, 43–50.

Azizah, N., Huwaida, J., & Khadafi, K. (2022). Penerapan Model Pembelajaran ICARE (INTRODUCTION , CONNECTION , APPLYCATION , REFLECTION & EXTENDSION) Untuk Meningkatkan Ranah Psikomotorik Siswa Pada Materi Fikih Di Pondok Pesantren Darul Fikri Ponorogo. In *FORDETAK:Seminar Nasional Pendidikan: Inovasi Pendidikan di Era Society 5.0* (pp. 186–190).

Carni, Maknun, J., & Siahaan, P. (2017). An Implementation of ICARE Aproach (Introduction, Connection, Application, Reflection, Extension) to Improve The Creative Thingking Skills. *Journal of Physics: Conference Series*, *1*(812).

Eliyawati, R. (2017). Peningkatan Mengungkapkan Monolog Deskriptif Lisan Menggunakan Sistem ICARE Pada Siswa Kelas VII SMPN 1 Karang Ploso. *Konstruktivisme*, *9*(1), 121–134.

Haidar, D. ., Yulianti, L., & Handayanto, S. . (2020). The Effect of Inquiry Learning With Scaffolding on Misconception of Light Material Among Fourth Grade Students. *Indonesian Journal of Science Education*, *9*(4), 540–553.

Herliani, Boleng, D. T., & Maasawet, E. T. (2021). *Teori Belajar dan Pembelajaran*. Lakeisha.

Ibrohim, Kamdi, W., Saryono, D., Dasna, I. W., & Wonorahardjo, S. (2021). *(Learning Inovation Book Series) Research Based Transdisciplinary Approaches*. Universitas Negeri Malang.

Kadir. (2015). *Statistik Terapan (Konsep,Contoh dan Analisis Data dengan Program SPSS/lisrel dalam pnelitian*. PT Raja Grafindo Persada.

Kemendikbud. (2022). Rapor Pendidikan. In *Rapor Pendidikan Dinas Satuan Pendidikan*. https://raporpendidikan.kemendikbud.go.id

Krisna, F. ., Sisdiana, E., Sofyatiningrum, E., & Hariyanti, E. (2020). Higher Order Thingking Skills Learning Policy in K-13 : Economic and Political Perspectives. *Jurnal Pendidikan Dan Kebudayaan*, *5*(1), 43–58.

Kurniawan, B., Wiharna, O., & Permana, T. (2018). Studi Analisis Faktor-Faktor yang Mempengaruhi Hasil Belajar pada Mata Pelajaran Teknik Listrik Dasar Otomotif. *Journal of Mechanical Engineering Education*, *4*(2), 156. https://doi.org/doi: 10.17509/jmee.v4i2.9627

Nyoman, N., Arianti, S., Astawan, I. G., & Krisnaningsih, M. (2021). Penerapan Model Pembelajaran ICARE untuk Meningkatkan Hasil Belajar IPS Siswa Kelas IVB SD. *Jurnal Ilmiah Pendidikan Profesi Guru*, *4*(2), 240–250. https://doi.org/http://dx.doi.org/10.23887/jippg.v4i2

OECD. (2019). Programme for International Student Assessment Result from PISA 2018. In *oecd* (pp. 1–10).

Payadnya, I. P. A. ., & Jayantika, I. G. A. N. . (2018). *Panduan Penelitian Eksperimen Beserta Analisis Statistik Dengan SPSS*. Deepublish.

Puspendik. (2019). PISA. In *Pusat Penilaian Pendidikan Balitbang Kemendikbud*.

Rayanto, Y. ., & Supriyo. (2022). The Effectiveness of ICARE Model on Micro Teaching Subjects through Hybyid Learning Class. *International Journal of Humanities Education and Social Sciences (IJHESS)*, *1*(6), 929–938.

Saragih, H., Hutagulung, S., Mawati, A. T., Chamidah, D., Khalik, M. ., Sahri, Purba, P. W. ., PURBA, S. R. F., & Kato, I. (2021). *Filsafat Pendidikan*. Yayasan Kita Menulis.

Sari, I. K. W., & Wulandari, R. (2020). Analisis Kemampuan Kognitif Dalam Pembelajaran IPA SMP. *Jurnal Pendidikan Dan Pembelajaran Sains Indonesia (JPPSI)*, *3*, 145–152.

Suartama, I. K., Putu, L., Mahadewi, P., Gede, D., Divayana, H., & Yunus, M. (2022). ICARE Approach for Designing Online Learning Module Based on LMS. *International Journal of Information and Education Technology*, *12*(4). https://doi.org/10.18178/ijiet.2022.12.4.1619

Sugiyono. (2019). *Statistika untuk Penelitian*. Alfabeta.

Sun, C., Liu, J., Razmerita, L., Xu, Y., & Qi, J. (2022). Higher Education to Support Sustainable Development: The Influence of Information Literacy and Online Learning Proses on Chinese Postgraduates Innovation Performance. *Multidisciplinary Digital Publishing Institute (MDPI)*, *14*(7789).

Yun, W., Longkai, W., Sujin, H., Nathanel, H. E. ., Beng, C. ., Chee, K. ., & Yiyu, C. (2023). Integrating Augmented Reality Into Inquiry Based Learning Approach in Primary Science Classroom. *Association for Educational Communications and Technology*, 1631–1651.