Vol.11 (1), 2022, 42-52 DOI: 10.23960/jppk.v11.i1.2022.05
Jurnal Pendidikan dan Pembelajaran Kimia
e-ISSN: 2714-9595| p-ISSN 2302-1772
http://jurnal.fkip.unila.ac.id/index.php/JPK/index

Implementation of *ICARE* Learning Model to Train Science Process Skills on Electrolyte and Non-Electrolyte Solution Materials for Educators at Muhammadiyah High School 10 GKB Gresik

Intan Wulandari[1], Muchlis[2]

[1,2]Chemical Education, Department of Chemistry, Faculty of Mathematics and Natural Sciences, State University of Surabaya, Ketintang Campus, Jalan Ketintang, Surabaya 60231, Jawa Timur, Indonesia.

*Correspondinge-mail: intan.18067@mhs.unesa.ac.id.

Received: February 24th, 2022 Accepted: April 9th, 2022 Online Published: April 13th, 2022

Abstract: Implementation of ICARE Learning Model to Train Science Process Skills on Electrolyte and Non-Electrolyte Solution Materials for Educators at Muhammadiyah High School 10 GKB Gresik. This research aims to describe the traceability of the ICARE learning model, student activities, student science process skills skills through the application of the ICARE learning model, and student responses after the ICARE learning model is applied. The research used One Group Pretest-Postest Design with the subject of this study was X MIPA 1 students in Muhammadiyah 10 GKB Gresik, totaling 25 students. Data from the results of this study indicate that (1) The implementation of the ICARE learning model in electrolyte and non-electrolyte solution material during three meetings obtained an average percentage of 95,54%, 96,49%, and 97,78% with same good criteria. (2) The percentage of relevant student activity is greater than the activity of irrelevant students, at 93,02%, 95,15%, and 97,78%. (3) Student science process skills are increased where the average N-gain Score is 92% of students with high categories and 8% of students with moderate categories. In contrast, students' percentage of clastalentterity is 100%. (4) The results of the students' response application of the ICARE learning model received positive results with an average percentage of 90,4% on excellent criteria

Keywords: ICARE learning model, Student science process skills, electrolyte and non-electrolyte solution

Abstrak: Implementasi Model Pembelajaran ICARE untuk Melatih Keterampilan Proses Sains pada Materi Larutan Elektrolit dan Non Elektrolit bagi Peserta Didik di SMA Muhammadiyah 10 GKB Gresik. Penelitian ini digunakan untuk mendiskripsikan keterlaksanaan model pembelajaran ICARE, aktivitas peserta didik, keterampilan proses sains peserta didik melalui penerapan model pembelajaran ICARE, dan respon peserta didik setelah diterapkan model pembelajaran ICARE. Penelitian ini menggunakan One Group Pretest-Postest Design dengan sampel peserta didik kelas X MIPA 1 SMA Muhammadiyah 10 GKB Gresik yang berjumlah 25 peserta didik. Data hasil riset ini adalah (1) Keterlaksanaan model pembelajaran ICARE pada materi larutan elektrolit dan nonelektrolit selama tiga kali pertemuan memperoleh rata-rata persentase berturut-turut sebesar 95,54%, 96,49%, dan 97,78% dengan kriteria sangat baik. (2) Persentase aktivitas peserta didik yang relevan lebih besar daripada aktivitas peserta didik yang tidak relevan yaitu sebesar 93,02%, 95,15%, dan 97,78%. (3) Keterampilan proses sains peserta didik meningkat dimana rata-rata N-gain Score sebesar 92% peserta didik dengan kategori tinggi dan 8% peserta didik dengan kategori sedang, sedangkan persentase ketuntasan klasikal peserta didik sebesar 100%. (4) Hasil angket respon peserta didik terhadap penerapan model pembelajaran ICARE memperoleh hasil yang positif dengan besar persentase rata-rata sebesar 90,4% pada kriteria sangat baik.

Kata kunci: Model Pembelajaran ICARE, Keterampilan Proses Sains, Larutan Elektrolit dan Nonelektrolit

▪ INTRODUCTION

The 2013 curriculum objectives to provide a efficient, creative, innovative, affective Indonesian populace thru strengthening included attitudes, abilities, and knowledge (Kemindikbud, 2016). In its arrangement and refinement, the object of learning is natural, social, artistic and cultural phenomena. Subjects that are objects of natural phenomena are used to develop students' attitudes, skills, and biological knowledge. One of the subjects that are the object of natural phenomena is the subject of chemistry.

Chemistry subjects are the science of learning about substances, including structure, energetics of mattter, properties, dynamics, change, and composition involving skills and reasoning (Kemendikbud, 2016). Chemical learning is not only learning that requires mastery of concepts, but natural and scientific application is also needed in the learning process (Haryadi and Nurhayati, 2015).

In addition to understanding chemical concepts, it is suspposed to have process skills in order to complete problems either during the learning process or even in daily life in the context of science (Rahmawati, et al, 2016). One chemical subject related to mastery of concepts in a scientific context is an electrolyte and non-electrolyte solutions. Learning electrolyte and non-electrolyte solutions is one of the chemical materials, where students expect to be able to understand the concepts of solutions, electrolyte solutions, non-electrolyte solutions, reactions, and ionization (Zahra and Ismono, 2017).

But facts are found in learning the concept of electrolyte and non-electrolyte solutions, namely the lack of mastery of concepts in the context of student science. Based on the pre-research results conducted on 4 January 2022 in class X MIPA 1 Muhammadiyah High School 10 GKB Gresik totaling 25 students, the results of the armature in pre-research activities showed 76% of students stated that electrolyte and non-electrolyte solution material was material that was difficult to study in chemical subjects.

In another screening in SMAN 1 The base in class X MIPA 3 shows that learning the concept of electrolyte and non-electrolyte solutions is still lacking mastery i.e. strengthened from the pre-student sequences showing 77.14% of students stated that materials were difficult to study. Whereas the interview results in class XI state that the material at the time of learning does not carry out practicum activities, so students only memorize the difference from electrolyte non-electrolyte solutions but do not master the concept well. The material characteristics not only emphasize mastery of concepts but also through practicum activities such as observing, analyzing, and concluding independently (Zahra and Ismono, 2017). Students with high scientific process skills can carry out experimental activities properly, making it easier to understand the material taught through the experimental activities carried out. (Mahmudah and Sholahuddin, 2016). So students can develop process skills and scientific attitudes. Based on this, learning processes are needed that can stimulate science process skills that improve learning outcomes in a scientific context. Students' learning problems in the context of scientificcan be overcome by application of learning that involves science process skills (Rahmawati, et al, 2016).

According to Abungu et al. (2014), definition science process skills are the skills of students in understanding, developing and empowering their learning processes to discover science so that learning science is not only known but must be understood. For students science process skills are very important as provisions to developing the scientific context, as well as being expected to gain new knowledge. (Yamtinah, 2016).

Basically to encourage students to develop a scientific context, can go through an observation and experience process by using a constructivism approach (Hartanto, 2013). One learning model that is in line with the constructivism approach is the *ICARE* learning model. *ICARE* learning model is a learning model consisting of five stages viz Introduction, Connection, Application, Reflection, and Extension (Muharti, 2016). According to Farida (2017), each phase is in the *ICARE* learning model potentially digging into the knowledge of yan students according to the theory of constructionism so that it can bring up students' scientific process skills. The initial stage is introduction Science process skills that have the potential to emerge are observing and asking questions. Then at the connecting stage the science process skills that emerge at this stage are hypothetizing. Application stage where students practice or apply new knowledge that they have obtained from the stage connect the science process skills that emerge at this stage are designing and conducting experiments. Next on the reflection stage students are given the opportunity to riview on what they have learned in the classroom. Science process skills that appear at the stage reflection is the interpretation of data (associate), infer and communicate. The last stage is extend, the emerging science process skills are applying concepts of the material.

Utility of *ICARE* learning model can practice students' scientific process skills in electrolyte and non-electrolyte solution materials, which are indicated by the results of the t-test showing the table > ttabel, which is 5.9 > 2.0. In addition, the increase in PPP in the trial class was 0.61 in the moderate category while in the control class it was 0.40 in the moderate category (Mahdian, 2019).

Based on the description described above, to practice the science process skills it is expected that the *ICARE* learning model can be applied in high school or even senior secondary education, so research require to be done under the heading "Implementation of *ICARE* Learning Model to Train Science Process Skills on Electrolyte and Non-Electrolyte Solution Materials for Educators at Muhammadiyah High School 10 GKB Gresik". Based on this title, it is necessary to observe the traceability of the *ICARE* learning model in order to convince students' scientific process skills. The activities of students also estend to be observed to ensure that students have been relevant to the *ICARE* learning model and have practiced science process skills. To find out the students' scientific process skills, so it is necessary to assess the students' science process skills. The results of learning process with the *ICARE* learning model are considered good or not, it is necessary to respond to each student.

▪ METHOD

This study uses a type of pre-experiment research (pre-experimental design) by using one class without any control class. This method is used to find out the different levels of student science process skills in class X Muhammadiyah 10 GKB Gresik High

School provided using a learning model *ICARE* on electrolyte and non-electrolyte solution material.

This research design uses design One Group Pretest Posttest i.e. research conducted on just a group not a comparison group that can be described as follows:

$$O_1 \text{ x } O_2$$

Notes :

O_1 : Pretest value to know the initial ability of students' scientific process skills before applying the *ICARE* learning model.

X : Application of *ICARE* learning

O_2 : Posttest score to know the final ability of students' scientific process skills after applying the *ICARE* learning model

Syllabus, RPP (Draft Implementation of Learning), LKPD (Work Sheet) are The learning tools used in this study. Research instruments include the ICARE learning model traceability sheet, student activity sheet, sheet pretest and post test and the participant response questionnaire.

Traceability data is obtained to find out the quality of traceability of each learning phase using an *ICARE* learning model by the teacher in class. The observation was observed by 2 observers of chemistry majors. Giving a score for the assessment of traceability learning this is analyzed using the formula as follows:

$$\text{Quality} = \frac{\Sigma\, scores\ obtained}{\Sigma\, criteria\ scores}\ x\ 100\%$$

(Riduwan, 2015)

The overall acquisition of the average value is converted to the criteria using the Likert scale reference presented in Table 1.

Table 1. Quality Criteria for Delinquency

Score	Description
0% – 20%	Very Bad
21% – 40%	Bad
41% – 60%	Good enough
61% – 80%	Good
81% – 100%	Very Good

(Riduwan, 2015)

Implementation of learning by applying *ICARE* learning model be carried out well if traceability quality score ≥ 61% or are on good or very criteria good.

Student activity data is a research method by way of observation that aims to know that students have practiced science process skills and carried out activities relevant to the stages of the *ICARE* learning model. Student activity could calculated by the following equation:

$$\%\ \text{Activity} = \frac{\Sigma\, Frequency\ of\ activity\ that\ appears}{\Sigma\, overall\ activity\ frequency}\ x\ 100\%$$

(Riduwan, 2015)

Student activity is said to be well done if the percentage of relevant student activity is greater than the activity of irrelevant students.

Data analysis of learning outcomes of science process skills obtained from the difference in the difference between values pretest and posttest. The score data obtained by each student is analyzed to determine its value using the following formula:

$$\text{Score} = \frac{\Sigma\ scores\ get}{\Sigma\ maximum\ score}\ x\ 100$$

Improved learning outcomes of student science process skills counted use value *N-Gain score*. Formula for determining N-Gain score as follows:

$$\textit{N-Gain score} = \frac{\text{post test score} - \text{pretest score}}{\text{maximum score} - \text{pretest score}}$$

Based on the N-Gain score obtained by students is interpreted by the categories in Table 2.

Table 2. N-Gain Score criteria

N-Gain score <g>	**Category**
≥ 0,7	High
0,7 > <g> ≥ 0,3	Standard
<g> < 0,3	Low

(Hake, 1999)

Student science process skills are said to be successful if the number of students who get results *N-Gain score* as big as 0.3 - 0.7 with the medium category and / or ≥ 0.7 with the high category amounting to 75% or more.

In addition, a calculation of the classical dexterity of the learning outcomes of students is also carried out with the following formula:

$$\%\text{Classical dexterity} = \frac{\Sigma pass\ students}{\Sigma \text{all of students}}\ x\ 100\%$$

The classic alignment of students' scientific process skills is stated to be complete if ≥75% of students have achieved a minimum value equal to or exceed standard of minimum completeness. The standard of minimum completeness is value ≥75.

Analysis of the response of students to know the responses of students to the application of the learning model *ICARE* used by the teacher. The response of students can be analyzed using the equation:

$$\%P = \frac{F}{N}\ x\ 100\%$$

Description :

F = the amount of answering students

N = the amount of respondents

The results of the percentage of students' responses obtained are then analyzed according to the categories in Table 3 below:

Table 3. Criteria of Students' Responses

Percentage	**Category**
0% - 20%	Very Bad
21% - 40%	Bad
41%- 60%	Good Enough
61% - 80%	Good
81% - 100%	Very Good

(Riduwan, 2015).

Student responses to *ICARE* learning models effective applied for practice science process skills students if it has reached the percentage ≥ 61% is in the good or very good category.

▪ RESULT AND DISCUSSION

The Implementation of *ICARE* Learning Model

The implementation of *ICARE* learning model observed by three observers from UNESA chemistry majors in class X MIPA 1 Muhammadiyah High School 10 GKB Gresik using the observation page for the traceability 3 times the meeting. The purpose of this analysis is used to find out the quality of the traceability of the *ICARE* learning model, which has been compiled in the RPP to show whether teachers have impaired the science process skills in classroom learning. The percentage of traceability is said to be good if you get a percentage of 61% - 80% and it is very good if you get a percentage of 81%-100% (Riduwan, 2015).

ICARE is an abbreviation of introduction, connecting, application, reflecting, and extension (Yusra, 2018). Phase 1, i.e. Introduction this phase explains the learning objectives and results to be achieved during learning activities. Phase 2, i.e. connection (connecting) where the teacher tries to connect new knowledge with something that students already know from previous. Phase 3, i.e. application (apply) after students gain new knowledge through stages connection , teachers need to be given the opportunity to practice or apply that. In this phase the teacher divides students into 5 groups of 5 students. Students are guided to collect data through practicum activities based on instructions under the LKPD. Then the students conduct discussion activities with their group. LKPD is able to help improve the ability of students and can help bring up difficulties when learning while solving these difficulties with group discussions (Ardiyani, 2017). Phase 4, i.e. reflection (reflect) is a summary part of learning, where at this stage the teacher gives students the opportunity to express what they have learned . Phase 5, i.e. extension (expand) where at this stage the teacher provides additional reading material for students to expand their knowledge or also be able to provide the task of observing in the surrounding environment so that their understanding of learning materials is stronger and more meaningful. This is in line with the opinions of Asri, Rusdiana, & Feranie (2016) who suggest that the *ICARE* learning model giving teachers the opportunity to change students' gaining knowledge of experiences via emphasis at every level. So students can color the learning process and understanding concepts about this materials.

Quality results of the traceability of the *ICARE* learning model listed in Table 4.

Table 4. Percentage results of traceability of *ICARE* learning models.

Activity	Percentage (%)			Average	Criteria
	P1	P2	P3		
Phase 1	99,07	100	100	99,69	Very good
Phase 2	91,67	94,44	91,67	92,59	Very good
Phase 3	95,31	96,35	97,22	96,29	Very good
Phase 4	91,67	91,67	100	94,44	Very good
Phase 5	100	100	100	100	Very good
Average	95,54	96,49	97,78	96,60	Very good

The average quality of traceability of *ICARE* learning models at the first, second and third meetings in a row get percentages of 95.54%, 96.49%, and 97.78%. Overall in three times the meeting the traceability of the *ICARE* learning model very well implemented, this showing that the learning activities according to the syntax of the *ICARE* learning model . The opinion of the Ratumanan (2004) accordance with this research which states that teachers are an important figure in the success of learning activities carried out.

Students' Activity

Student activity was observed by three observers from UNESA chemistry majors in class X MIPA 1 Muhammadiyah High School 10 GKB Gresik. The student activity observation sheet is observed every 3 minutes for 45 minutes in three meetings. The purpose of observing the activities of students is to know that students have practiced science process skills and carried out relevant activities according to the syntax of the *ICARE* learning model.

Table 5. Students' percentage result

Meeting	Average percentage of relevant activity	Average percentage of irrelevant activity
1st meeting	93,02%	6,98%
2nd meeting	95,15%	4,85%
3rd meeting	97,78%	2,22%

Every phase in the *ICARE* learning model potentially digs into students' knowledge in accordance with the theory of constructionism which can give rise to students' scientific process skills (Farida, 2017). In the activity, the students observe the phenomenon, mention the objectives to be achieved and make questions to the teacher when giving an initial explanation reflecting Phase 1, the recognition stage (introduction) where the potential science process skills emerge are observing and asking questions. Observing activities are the most basic skills in science and are important for developing other process skills (Yuliati, 2016). In the activity of students making formulations of problems and hypotheses based on the phenomenon in the LKPD reflecting phase 2, the connecting stage (connect) where the science process skills that emerge at this stage are hypothesizing. When students are able to connect new knowledge with previous knowledge they will also be able to express temporary answers to the problems they will examine because they already have the basic knowledge they have gained and know in advance. This is in accordance with the opinion of Ozgelen (2012), which formulates a hypothesis that can help develop science process skills.

The activities of students conducting trial persistence with their groups are activities that reflect phase 3, the application stage (apply) where students practice or apply new knowledge that they have got from the stage connect. The science process skills that emerge at this stage are conducting experiments. Conducting experimental activities shows that it can increase the value of other scientific process skills indicators (Suhanda, 2018). At this stage, students conduct a hypothesis test be tested for truth through direct experiments. In the activities of the students present the results of group discussions in the LKPD and conclude learning is an activity that reflects phase 4, the reflection stage (reflect) where the science process skills that emerge at this stage are interpretation of data, concluding and communicating. Students are given the opportunity to express what they have learned by discussing delivering the results in front of the class, at this stage each group can submit their opinions until finally a conclusion about learning. This is in accordance with Ayd's opinion (2013) that concluding can train skills to a higher level. Whereas the student's activities that reflect phase 5, the expand stage (extend) at this stage the emerging science process skill is to apply the concept where students are trained to use the concepts students have to explain new events in the new situation they face (Mahdian, 2019). The skill of applying concepts is the skill of using learning outcomes in the form of information, conclusions, concepts, law, theory and skills in new situations (Fitriana, 2019).

Based on Table 5 above shows that the activities of students are carried out very well during learning activities that are in accordance with the syntax of the *ICARE* learning model as well as students practicing science process skills during three meetings. This is characterized by the results of a greater percentage of relevant student activity compared to the percentage of irrelevant student activity. The percentage of relevant student activity at the first, second and third meetings in sequence was 93.02%, 95.15%, and 97.78%. Wheras the percentage of student activity that was not relevant at the first, second and third meetings was 6.98%, 4.85%, and 2.22%. Application of *ICARE* learning models make students have skills so students can increase learning activities and be extra active inside the mastering process (Wahyudin, 2010).

Learning Outcomes of Science Process Skills

Use of *ICARE* learning models aim that students apply what they have learned. Students can also construct their own knowledge when there is a connecting stage (*connect*) where students are guided to be able to connect new knowledge with prior knowledge and understanding concepts of learning material to improve science process skills. (Mahdian, 2019).

In this study, the learning outcomes of students are known through *pretest* which is carried out before learning activities and *posttest* which is done after learning activities. *Pretest* and *posttest* questions have gone through a validation process by a UNESA chemistry major lecturer with criteria worth using. Data on this learning outcomes to find out the improvement of students' scientific process skills, before and after implementing the *ICARE* learning model.

Table 6. Percentage increase in student science process skills

Category	Percentage
High	92%
Medium	8%
Low	0%

Based on Table 6 shows the outcome of improving the science process skills after obtaining material learning of electrolyte and non-electrolyte solutions using *ICARE* learning models. Overall, 92% of *N-gain score* of students with high categories and 8% of students obtain moderate categories. In addition, the classic dexterity is also calculated, which can be seen in Table 7.

Tabel 7. Percentage of dexterity of learning outcomes of science process skills

Dexterity	***Pretest***	***Posttest***
Pass	8%	100%
Not Pass	92%	0%

Based on Table 7 shows the percentage of learning at the time pretest, 2 students gained 8% dexterity and 23 students obtained no due diligence of 92%. While at the time posttest percentage of learning outcomes of science process skills 25 students get 100% dexterity. Students who get the dexterity show that the learning results got are above or equal to standard score ie ≥ 75. The classical accuracy got by MIPA class X students 1 Muhammadiyah High School 10 GKB Gresik is over 75% so that it belongs to the category of both achieving the completion of the learning outcomes of scientific process skills on this materials.

This shows that the application of *ICARE* learning models used in the learning process is effective in training students' scientific process skills in this materials. This is proven by results *N-gain score* which reaches the high and medium categories and the results of the classical dexterity of students by 100%. This research is similar to the research of Mahdian and Nurul showing that the *ICARE* learning model can improve students' science process skills with the result of improving students' scientific process skills in the experimental class higher than the control class. Other studies conducted by Wulandari, Prasetyaningtyas, & Hartati (2017) also prove that the *ICARE* learning model effectively improve IPA process skills. In addition, Fajri, Ratnawulan, & Syafriani (2016) in their research showed LKS *ICARE* learning models influence on the competency of students' science. Pros of *ICARE* learning model i.e. teachers and students can balance between theory, teacher explanation, and direct experiments conducted by students. In addition, it gives teachers the opportunity to apperception on each learning so that students better understand the subject matter being taught and can improve learning outcomes (Mazidah, 2020). *ICARE* learning model can help optimize students' science process skills because they put forward lively, creative, and fun features primarily based on students' mastering desires (Wahyudin, 2010).

Students' Response Questionnaire

The student response questionnaire contains the opinions or responses of students to learning activities using the *ICARE* learning model which is applied to practice science process skills. Measurements are made using the participant response questionnaire distributed through *Google Form* with 25 respondents in the form of 15 points of armature related to the response of students to the application of the *ICARE* learning model to practice science process skills in class. The division of the response of students is done at the end of the learning meeting and gets positive results because of a percentage of ≥ 61%. The response of students who answered "Yes" means a positive response, while students who answer "No" means a negative response.

The outcome of the response of students, it can be said that the application of the *ICARE* learning model in electrolyte and non-electrolyte solution materials as a means of training the science process skills to get positive responses. The average percentage outcome on all statements is 90.4% or is on very good criteria. The students' positive response shows the success of the teacher towards applying the *ICARE* learning model and students have been diluted with the science process skills.

▪ CONCLUSION

Based on the results of the study so it could be concluded that the implementations of the *ICARE* learning model in electrolyte and non-electrolyte solution material show the average quality of traceability at the three meetings in a row getting a percentage of 95.54%, 96.49%, and 97.78% was included in the criteria very well. The activities of students in each learning are well done by the acquisition of a percentage of relevant student activity greater than the percentage of irrelevant student activity. The percentage of relevant student activity at the three meetings in the sequence was 93.02%, 95.15%, and 97.78%. Student science process skills are diluted through the application of *ICARE* learning models electrolyte and nonelectrolyte solution material increases. This is proven by 92% of *N-gain score* of students with high categories and 8% of students are classified as moderate categories. Students have obtained a 100% classic settlement. Student responses to the application of *ICARE* learning models to practice the science process skills in electrolyte and non-electrolyte solution materials obtain positive student response results as evidenced by the average percentage of statements which is 90.4% on very good criteria.

▪ REFERENCES

Abungu, H,E., Okere, M.I.O., & Wachanga, S.M. (2014). The Effect of Science Process Skills Teaching Approach on Secondary School Students’ Achievement in Chemistry in Nyando District, Kenya. *Journal of Educational and Social Research,* 4(6):359-372.

Ardiyani, Ni Kadek Dwi, I Gede Mahendra Darmawiguna, dan I Gede Partha Sindu. (2017). *Penerapan Model Pembelajaran ICARE Untuk Meningkatkan Hasil Belajar Pengolahan Citra Digital*. Kumpulan Artikel Mahasiswa Pendidikan Teknik Informatika. Karmapati.

Asri, Y. N., Rusdiana, D., & Feranie, S. (2016). ICARE Model Integrated with Science Magic to Improvement of Students' Cognitive Competence In Heat and Temperture Subject. *1st International Conference of Mathematics and Science Education (ICMSEd) (pp. 137-139).* Bandung: Atlantis Press

Ayd, A. (2013). Representation of Science Process Skills in The Chemistry Curricula for Grades 10, 11, and 12 / Turkey. *International Jurnal of Education and Practice, 1* (5), 51-63

Fajri, N., Ratnawulan, & Syafriani. (2016). Pengaruh LKS Terintegrasi Nilai Karakter dalam Model ICARE Terhadap Kompetensi IPA Siswa Kelas VII SMPN 35 Padang. *Pillar of Physics Education, 8*, 161-168.

Farida, I. (2017). *Evaluasi Pembelajaran Berdasarkan Kurikulum Nasional*. Bandung: PT Remaja Rosdakarya.

Fitriana, F., Kurniawati, Y., & Utami, L. (2019). Analisis Keterampilan Proses Sains Peserta Didik Pada Materi Laju Reaksi Melalui Model Pembelajaran Bounded Inquiry Laboratory. *JTK (Jurnal Tadris Kimiya), 4*(2), 226–236.

Hartanto, Theo J. Dkk. (2013). *Pengembangan Perangkat Pembelajaran Fisika Berbasis Kombinasi Model Pembelajaran Langsung dan Model Pembelajaran Kooperatif yang di Implementasikan Melalui Kegiatan Eksperimen pada Materi Kalor untuk Melatih Keterampilan Proses Sains*. Surabaya: Universitas Negeri Surabaya

Haryadi, D. N., & Nurhayati, S. (2015). Penerapan Model Learning Start With a Question Berpendekatan ICARE pada Hasil Belajar. *Jurnal Inovasi Pendidikan Kimia*, 9 (2), 1528-1537.

Kemendikbud. (2016). *Permendikbud Nomor 22 Tahun 2016 tentang Standar Proses Pendidikan Dasar dan Menengah*. Jakarta: Mendikbud.

Mahdian, dkk. (2019). Implementasi Model Pembelajaran ICARE (Introduction-Connect-Apply-Reflect-Extend) terhadap Keterampilan Proses Sains pada Materi Larutan Elektrolit dan Non Elektrolit. *Jurnal Penelitian Pendidikan IPA (JPPIPA). 5*.

Mahmudah, U., & Sholahuddin, A. (2016). Pemanfaatan Sumber Belajar Berbasis Lingkungan pada Pembelajaran Larutan Elektrolit dan Non Elektrolit

Menggunakan Model Inkuiri Terbimbing untuk Meningkatkan Motivasi, Pemahaman konsep, dan Keterampilan Proses Sains Siswa. *QUANTUM, 7* (1), 46-54

Mazidah, N., Titin Kartini, & Sri Kantun. (2020). Penerapan Model Pembelajaran ICARE untuk Meningkatkan Aktivitas dan Hasil Belajar Siswa. *Jurnal Pendidikan Ekonomi. 14*

Muharti, Mis. (2016). "Pengaruh Penerapan Model *ICARE (Introduction, Connect, Apply, Reflect, Extend)* terhadap Kemampuan Kognitif dan Keterampilan Berpikir Kritis Peserta didik SMK", *Tesis* pada Pascasarjana UPI Bandung: tidak dipublikasikan.

Ozgelen, A., Suryani, L., & Mbagho, H.M. (2012). Students' Science Process Skills Within A Cognitive Domain Framework. *Eurasia Journal of Mathematics, Science and Technology Education, 8* (4), 283-292.

Rahmawati, Koes H, S., & Dasna, I. W. (2016). Kajian Pengaruh Learning Cycle 5E terhadap Keterampilan Proses Sains Peserta Didik SMP. Pros. *Semnas Pend. IPA Pascasarjana UM.* 1, pp. 1063-1070. Malang: Universitas Negeri Malang.

Ratumanan, T. G. (2004). *Belajar dan Pembelajaran*. Surabaya: UNESA: University Press.

Riduwan. (2015). *Skala Pengukuran Variabel-variabel Penelitian*. Bandung: Alfabeta

Suhanda, dan Sugeng Suryanto. (2018). Penerapan Pembelajaran Kimia Berbasis Proyek Untuk Meningkatkan Keterampilan Proses Sains Siswa Kelas X Sma Negeri 2 Purworejo. *Jurnal Inovasi Pendidikan Kimia*.

Wulandari, D., Fitria Dwi Prayetyaningtiyas, Sri Hartati. (2017). *Pengembangan Pembelajaran ICARE berkarakter untuk membekali kemampuan keterampilan proses IPA mahasiswa calon guru sd*. Semarang: Universitas Negeri Semarang.

Wahyudin, D. (2010). Model Pembelajaran ICARE Pada Kurikulum Mata Pelajaran TIK di SMP. *Jurnal Penelitian Pendidikan, 11* (1), 23-33.

Yamtinah, S., Haryono, M. Bakti, dan A.S. Shidiq. (2016). *Pelatihan Guru Kimia SMA dalam Mengembangkan Tes Jenis Testlet dan Profil Individu untuk Mengukur Keterampilan Proses Sains*. Makalah disajikan dalam Prosiding Seminar Nasional Pendidikan Sains (SNPS), Surakarta, 22 Oktober.

Yani, Yusra. (2018). *Pengembangan Modul Pembelajaran Berbasis ICARE (Introduction, Connection, Application, Reflection, Extension) Pada Mata Pelajaran Matematika Siswa SMP/MTs* Skripsi. Banda Aceh: UIN Ar-Raniry.

Yuliati, Y. (2016). Peningkatan Keterampilan Proses Sains Siswa Sekolah Dasar Melalui Model Pembelajaran Berbasis Masalah. *Jurnal Cakrawala Pendas.* Vol. 2 No. 2 Issn: 2442-747071

Zahra, Eli E.E. dan Ismono. (2017). *Peningkatan Keterampilan Proses Sains dan Penguasaan Konsep Peserta didik Melalui Penerapan Model Pembelajaran Inkuiri Terbimbing Materi Larutan Elektroli dan Non Elektrolit.* Surabaya: Universitas Negeri Surabaya.