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Research Article

Analysis Student's Communication Skills Using ICARE-U Learning Model on Energy Sources Materials

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Abstract.
The research aimed to analyze the impact of the ICARE-MBI2 (ICARE-U) learning model on students communication skills on energy source materials. The ADDIE design (analysis, design, development, implementation, evaluation) was applied. The participants of this research are 13 male students called “Mekhanai” and 17 women called “Muli” (Lampungnese tribe) of class 12 in Senior High School in Bandar Lampung. The instruments used in this study were creative thinking skills tests, with four communication skills indicators by Partnership 21 framework. The improvement of communication skills can be seen from the average communication skills of task 1 and task 2 were 52.5 and 95.75 and there is a significant impact on students’ communication skills on energy sources materials. Student responses were analyzed after using the ICARE-U learning model with the Rasch model analysis. The results measure was 0.60 with an average of 0.54 for 30 students and 10 questions. Student’s communication skills had improved after receiving learning using the ICARE-U learning model with students’ worksheets and learning website as multimedia. Based on this research, learning using the ICARE-U model impacts students communication skills on energy source materials.

Keywords: communication skills, ICARE-U learning model, energy

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1. INTRODUCTION

The skills needed by students in curriculum 13 (K13) must be implemented through innovative learning models that incorporate Higher Order Thinking Skills (HOTs) skills. Curriculum 13 (K13) emphasizes students’ ability to think critically and creatively, also communicate effectively (communication). Good communication skills are invaluable skills in the world of work and everyday life. Communication skills include skills in

conveying thoughts clearly and persuasively orally and in writing, the ability to convey opinions in clear sentences, convey clear commands, and be able to motivate others through good speaking skills [1]. There are several indicators of critical thinking skills: [2] formulating problems, namely a person's skills in analyzing every problem in a course, [3] providing arguments accompanied by scientific evidence from existing literature with good articulation, [4] implementing evaluation which is accompanied by facts, principles or existing guidelines and [5]draws conclusions, namely determining solutions to the problems that occur [6, 7]. As for communication skills, according to [8, 9] communication skills can be seen from several aspects, namely 1) oral communication, 2) written communication, 3) listening skill and 4) communication content.

According [10] communication is the process of conveying information, ideas, emotions, and abilities through the use of symbols, words, pictures, graphics, and numbers. According to [5], communication skills refer to a person's ability to communicate clearly through spoken, written, and non-verbal language. Communication skills are critical in mentally preparing students to communicate effectively in the educational, work, and social environments [11]. Students in classes with less than 50% participation have lower communication skills. This is because educators are still not doing a good job in training communication skills, as evidenced by the results of a questionnaire distributed via a google form, which revealed that 33.3% of educators are rarely trained in learning physics.

The ICARE model of learning consists of five stages: Introduction, Connection, Application, Reflection, and Extension. Bob Hoffman introduced the ICARE (Introduction, Connection, Application, Reflection, and Extension) model of learning at San Diego State University in 1997 [4]. It is currently being developed to develop Multimedia Based Integrated Instruction (MBI2) in order to address issues represented by media such as curriculum, learning materials, e-books, learning webs, student project reports, and evaluation tests. When the ICARE learning model is combined with MBI2, a new learning experience for students is created because it combines methods or approaches that effectively instill concepts in students with multimedia that makes physics learning interesting.

According to a previous study [12], the use of the ICARE model has an effect on the effectiveness of ICARE-based training, as evidenced by increased post-test results and the significance of the difference between pre-test and post-test as measured by N-Gain and t-test. Additionally, the same thing has been established [4] that the ICARE approach has been shown to improve the creative thinking abilities of middle school students in class X. In another study [13], they used Sadiman's research development

model to determine the collaboration skills profile of junior high school students. MBI2 research was utilized to improve students' oral communication skills in earth science by utilizing MBI2 [14]. Although the data obtained is considered satisfactory, it is required for continuous and comprehensive research, and assessing students' communication skills takes time. According to the description above, researchers are interested in examining the ICARE-U learning model's effect on communication skills regarding Energy Sources material.

2. RESEARCH METHOD

2.1. Research Methods

This research utilized the ADDIE design (Analysis, Design, Development, Implementation, Evaluation). The analysis stage is where the researcher ascertains the product's requirements and objectives. This research's product was a worksheet for students based on the ICARE-U model that is integrated with a learning web and virtual lab and an instrument that assesses communication skills. Researchers started the design stage by collecting, compiling, and designing the product that could be developed. During the instrument's development stage, researchers began validating the instruments given to three experts, two expert lecturers and one physics teacher. At the implementation stage, the researchers surveyed 30 students using the ICARE-U learning model and gave them two an assignment about their communication skills abilities and learning instruments. At the evaluation stage, tests were conducted to ascertain students' responses to the ICARE-U learning model on energy sources materials via a self-created questionnaire.

2.2. Participants

Participants of this research were 30 of twelve (13 male students, namely "Mekhanai" and 17 female students, namely "Muli") in senior high school Bandar Lampung. Bandar Lampung is located on Sumatra's southernmost island, at a distance of approximately 235.7 kilometers from Jakarta, the capital of Indonesia. Figure 1 shows a map distance Jakarta-Bandar Lampung, Indonesia.

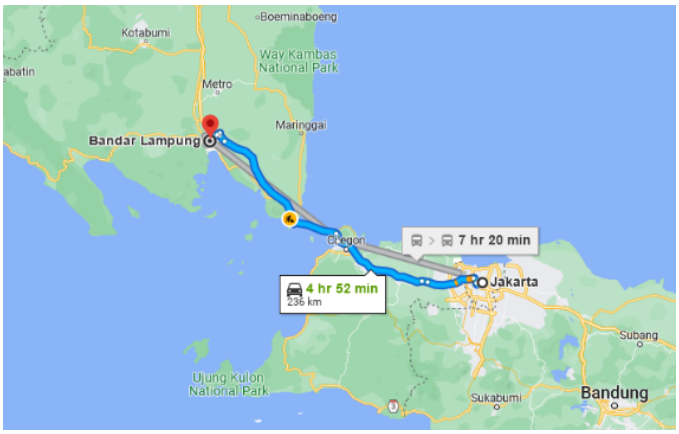
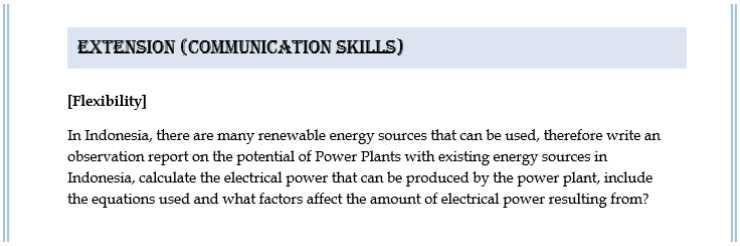


Figure 1: A Map of distance Jakarta-Bandar Lampung.
(Source:https://www.google.com/maps/dir/jakarta/Bandar+Lampung).

2.3. Instrument

The instruments used in this study were student worksheets incorporating the ICARE-U learning model, communication skills tests, and student response questionnaires. Figure 2 illustrate examples of creative and communication skills test questions.



EXTENSION (COMMUNICATION SKILLS)

[Flexibility]

In Indonesia, there are many renewable energy sources that can be used, therefore write an observation report on the potential of Power Plants with existing energy sources in Indonesia, calculate the electrical power that can be produced by the power plant, include the equations used and what factors affect the amount of electrical power resulting from?

Figure 2: Communication skills test.

3. RESULTS AND DISCUSSION

The following sections will discuss the ADDIE design phases (Analysis, Design, Development, Implementation, and Evaluation) and their analysis:

1. Analysis

   During the analysis phase, the researcher established the product's requirements and objectives. The development of research instruments based on the ICARE-U model was intended to serve as a teaching tool for applying the model to learning about energy sources in order to assess communication skills. This instrument was expected to aid educators and students in the process of learning about alternative energy sources.

2. Design

At this stage, the instrument used for learning was being designed using the ICARE-U model. The instrument consisted of student worksheets and test items and was graded according to the rubric for creative thinking. The Worksheet on Renewable Energy is depicted in Figure 3.

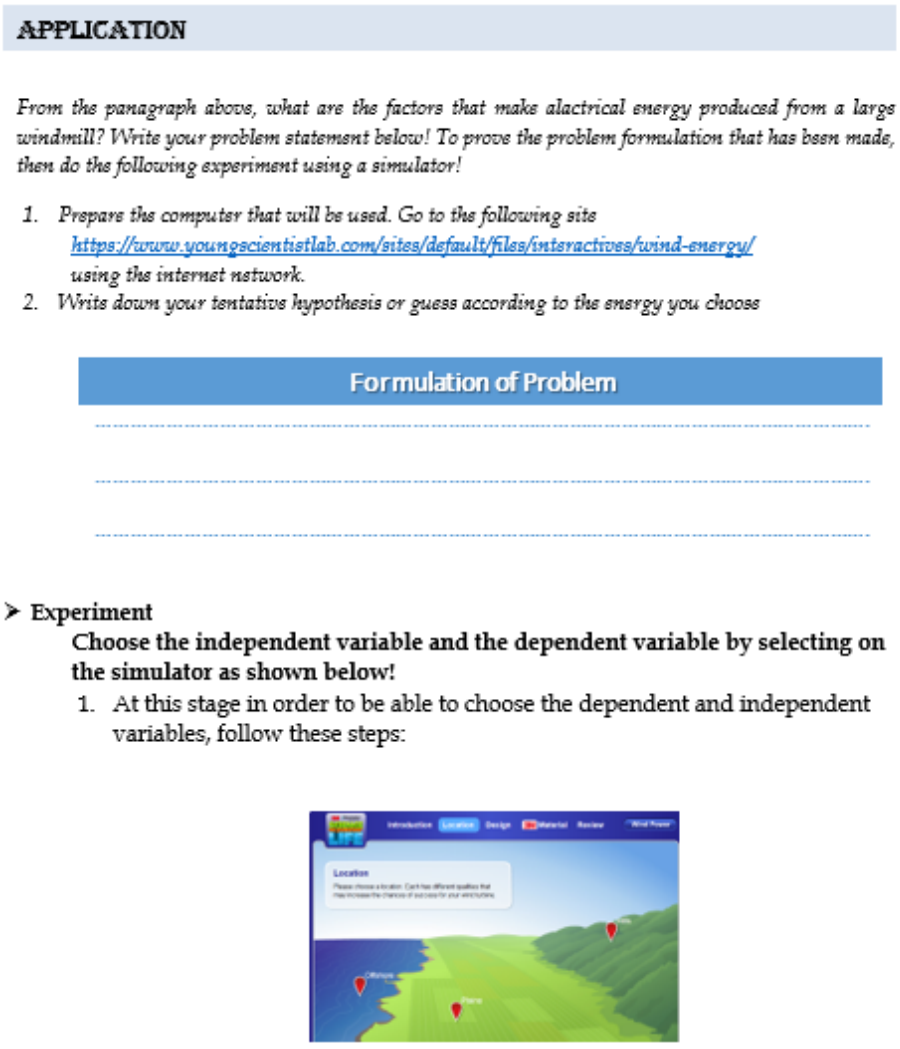


Figure 3: Student worksheet design for energy sources.

3. Development

We adopted a virtual laboratory from the previously developed young scientist lab during the development stage. This virtual lab was a multimedia presentation integrated with student worksheets and learning webs created by the authors

4. Implementation

Implementation is the stage in which the instruments created are put into action. Students' communication skills have improved significantly as a result of their exposure to the ICARE-U learning model on energy sources materials. The average communication abilities for tasks 1 and 2 are 52.5 and 95.75, respectively. Table 1 illustrates the average level of communication ability.

TABLE 1: The average score of communication skills.

Task	Indicator				average
	1	2	3	4	
Task 1	60	36	31	83	52,5
Task 2	98	68	98	119	95,75
Average	79	52	64,5	101	74,125

The score of communication skills on energy source materials for each indicator is presented in Figure 4.

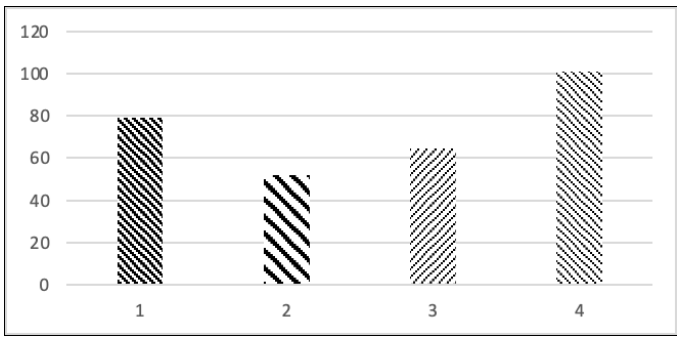
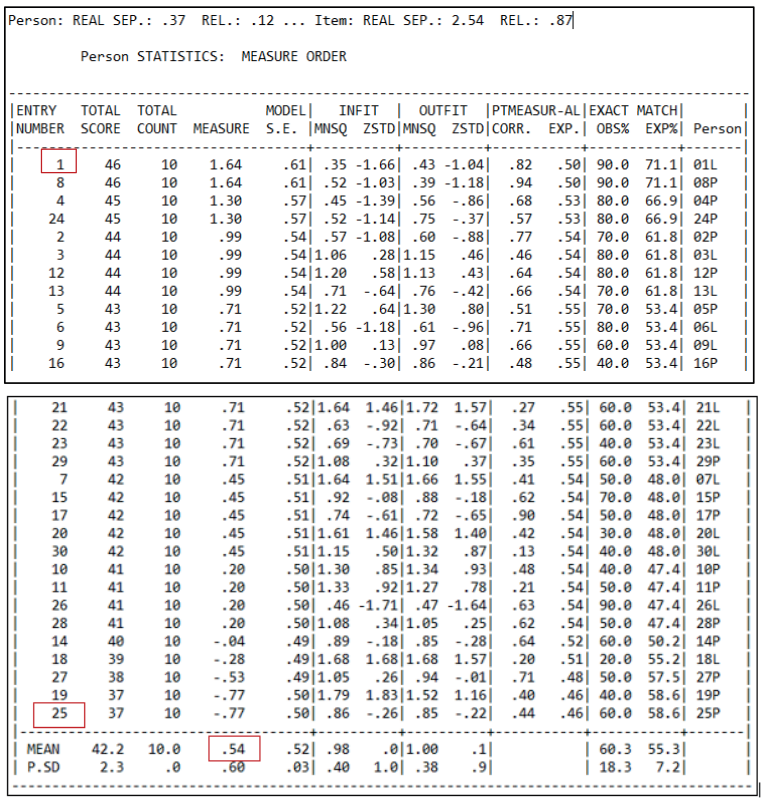


Figure 4: Communication skills score in each indicator.

5. Evaluation

The following evaluation stage involved the distribution of questionnaires to ascertain student responses to the ICARE-U learning model's use in the classroom. The questionnaire was made up of fifteen statements. Student response data were analyzed using the Likert scale, specifically by categorizing student responses as Strongly Agree (SS), Agree (S), Doubtful (R), Disagree (TS), and Strongly Disagree (STS). The responses were sequentially assigned a score of 5, 4, 3, 2, and 1, which was then expressed as a percentage of students' approval levels using the Rasch model analysis. The average percentage of student questionnaire responses fell into the agreed category at 84.5%. Students responses were analyzed using the Winstep application (Rasch Model Analysis), specifically the menu item measure. The results indicate a mean of 0.60 and a standard deviation of 0.54 for 30 students and ten questions. The highest score was obtained by 01L (Mekhanai),

while the lowest was obtained by 25P (Muli). The individuals who were measured are depicted in Figure 5.



Person: REAL SEP.: .37 REL.: .12 ... Item: REAL SEP.: 2.54 REL.: .87

Person STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEASUR-AL CORR.	PTMEASUR-AL EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Person
1	46	10	1.64	.61	.35	-1.66	.43	-1.04	.82	.50	90.0	71.1	01L
8	46	10	1.64	.61	.52	-1.03	.39	-1.18	.94	.50	90.0	71.1	08P
4	45	10	1.30	.57	.45	-1.39	.56	-.86	.68	.53	80.0	66.9	04P
24	45	10	1.30	.57	.52	-1.14	.75	-.37	.57	.53	80.0	66.9	24P
2	44	10	.99	.54	.57	-1.08	.60	-.88	.77	.54	70.0	61.8	02P
3	44	10	.99	.54	1.06	.28	1.15	.46	.46	.54	80.0	61.8	03L
12	44	10	.99	.54	1.20	.58	1.13	.43	.64	.54	80.0	61.8	12P
13	44	10	.99	.54	.71	-.64	.76	-.42	.66	.54	70.0	61.8	13L
5	43	10	.71	.52	1.22	.64	1.30	.80	.51	.55	70.0	53.4	05P
6	43	10	.71	.52	.56	-1.18	.61	-.96	.71	.55	80.0	53.4	06L
9	43	10	.71	.52	1.00	.13	.97	.08	.66	.55	60.0	53.4	09L
16	43	10	.71	.52	.84	-.30	.86	-.21	.48	.55	40.0	53.4	16P
21	43	10	.71	.52	1.64	1.46	1.72	1.57	.27	.55	60.0	53.4	21L
22	43	10	.71	.52	.63	-.92	.71	-.64	.34	.55	60.0	53.4	22L
23	43	10	.71	.52	.69	-.73	.70	-.67	.61	.55	40.0	53.4	23L
29	43	10	.71	.52	1.08	.32	1.10	.37	.35	.55	60.0	53.4	29P
7	42	10	.45	.51	1.64	1.51	1.66	1.55	.41	.54	50.0	48.0	07L
15	42	10	.45	.51	.92	-.08	.88	-.18	.62	.54	70.0	48.0	15P
17	42	10	.45	.51	.74	-.61	.72	-.65	.90	.54	50.0	48.0	17P
20	42	10	.45	.51	1.61	1.46	1.58	1.40	.42	.54	30.0	48.0	20L
30	42	10	.45	.51	1.15	.50	1.32	.87	.13	.54	40.0	48.0	30L
10	41	10	.20	.50	1.30	.85	1.34	.93	.48	.54	40.0	47.4	10P
11	41	10	.20	.50	1.33	.92	1.27	.78	.21	.54	50.0	47.4	11P
26	41	10	.20	.50	.46	-1.71	.47	-1.64	.63	.54	90.0	47.4	26L
28	41	10	.20	.50	1.08	.34	1.05	.25	.62	.54	50.0	47.4	28P
14	40	10	-.04	.49	.89	-.18	.85	-.28	.64	.52	60.0	50.2	14P
18	39	10	-.28	.49	1.68	1.68	1.68	1.57	.20	.51	20.0	55.2	18L
27	38	10	-.53	.49	1.05	.26	.94	-.01	.71	.48	50.0	57.5	27P
19	37	10	-.77	.50	1.79	1.83	1.52	1.16	.40	.46	40.0	58.6	19P
25	37	10	-.77	.50	.86	-.26	.85	-.22	.44	.46	60.0	58.6	25P
MEAN	42.2	10.0	.54	.52	.98	.0	1.00	.1			60.3	55.3	
P.SD	2.3	.0	.60	.03	.40	1.0	.38	.9			18.3	7.2	

Figure 5: Results of measure person student responses.

The ICARE-U model has a positive effect on high school students' ability to think communicate effectively regarding energy sources materials. Previous studies also demonstrate this, which indicate that the ICARE-U model has a pronounced effect on the students' creative thinking abilities [15]. The ICARE approach can help improve the creative thinking skills of high school students in class X when it comes to dynamic electrical materials [4]. In another study, Sadiman's research development model was used to determine the profile of junior high school collaboration skills [13]. The IMB2 study aimed to improve students' oral communication skills utilized MBI2 in earth science [14]. Communication skills are critical in mentally preparing students to communicate effectively in the educational, work, and social environments [11].

However, additional research is needed on oral communication skills, as distance learning is currently being implemented, limiting this study's examination of communication skills to written communication.

4. CONCLUSION

The improvement of students' communication skills has increased after receiving learning using the MBI2-assisted ICARE learning model on energy sources. The average communication skills of task 1 and task 2 are 52,5 and 95,75. The average percentage of student questionnaire responses fell into the agreed category at 84.5%. The results indicate a mean of 0.60 and a standard deviation of 0.54 for 30 students and ten questions. The highest score was obtained by 01L (Mekhanai), while the lowest was obtained by 25P (Muli). So, The ICARE-U model has a positive effect on high school students' ability to think communicate effectively regarding energy sources materials. When the COVID-19 virus outbreak occurred, the school's physical distancing and distance learning policies were carried out. So, students are required to be able to take part in online learning independently. Additional research is needed on oral communication skills, as distance learning is currently being implemented, limiting this study's examination of communication skills to written communication.

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