# Analysis of Conceptual Understanding of Grade V Elementary School Students on Water Material through RADEC Learning

**Gustiayu Juita Harun✉1, Atep Sujana2, and Wahyu Sopandi3**

1,2,3 Elementary Education, Indonesia University of Education, Bandung, Indonesia

✉ gustiayujuitaharun@upi.edu

**Abstract.** This research aimed to analyze the conceptual understanding of the fifth grade elementary school students on Water material through RADEC Learning. The method used was a qualitative approach with a qualitative descriptive design. The research subjects were fifth grade students in one of private elementary schools in the city of Bandung. The research data was collected with a test instrument. There were five test items used to obtain data on students conceptual understanding. The results of this study were that conceptual solving of students in grade V on water material through the RADEC learning model seen from grouping all results according to the dimensions of knowledge show that the RADEC model is good for helping students instill the dimensions of conceptual, metacognitive, and factual knowledge with successive percentages 81.78%, 79.31%, and 72.41%. Meanwhile, the procedural knowledge dimension obtained a percentage of 58.62%, meaning that the RADEC model was quite good at instilling the procedural knowledge dimension.

**Keywords:** RADEC, Conceptual Understanding, Natural Science, Water Material, and Elementary School.

**INTRODUCTION** ~ Since the emergence of Covid in March 2020 in Indonesia, all educational institutions in Indonesia have implemented distance learning to continue learning activities that were interrupted due to Covid-19 (Prawiyogi, Purwanugraha, Fakhry, & Firmansyah, 2020). Distance learning is a teaching and learning activity in which students and teachers are separated and use various learning resources through communication technology, information, and other media (Yuangga & Sunarsi, 2020). Distance learning not only makes teachers in schools, especially elementary schools, think about what technology and media can be used so that learning goals can be achieved optimally, but teachers also think about what models can be used to achieve learning goals. One of the learning models that can be used in distance learning is the RADEC learning model developed by Sopandi. It is because this model has stages that are in accordance with the characteristics of students in Indonesia and help improve the higher-order thinking skills of elementary school students (Sopandi, Pratama, & Handayani, 2019).

The results of the research conducted by (Pratama, Sopandi, Hidayah, & Trihastuti, 2020) regarding the Effect of the Radec Learning Model on the Higher-Level Thinking Skills of Elementary School Students show that the RADEC learning model has a positive influence on

students higher-order thinking skills compared to learning using the Inquiry model. This can be seen from the increase in the post-test score, the average value of 29.64 in the experimental class; while, in the control class, it is only 18.36.

In terms of the ability to write explanatory texts and students mastery of concepts through the implementation of the RADEC model, (D. Setiawan, Sopandi, & Hartati, 2019) found that students explanatory writing skills and students mastery of explanatory text concepts increased after being given learning using the RADEC model. In addition, (Maryani & Nurseptiani, 2019) researched the interest in learning Indonesian by comparing the RADEC learning model and the conventional learning model; the results of this study revealed that the RADEC learning model was quite successful in increasing interest in learning Indonesian compared to the conventional model.

Viewed from the abundance of positive impacts of implementing the RADEC learning model in several previous studies, the researchers are interested in applying the RADEC learning model in elementary schools in order to increase critical thinking skills, increase student interest in learning and students can have a good conceptual understanding. Considering that there are no researchers who have examined the conceptual understanding of the fifth grade students in terms of the dimensions of knowledge with distance or online learning with a focus on science material, the researchers are interested in conducting research with the title Analysis of Conceptual Understanding of the Fifth Grade Elementary School Students on Water Material through

RADEC Learning. This study aimed to analyze the conceptual understanding of the fifth grade elementary school students on Water material through RADEC learning.

## METHOD

The method used in this research was a qualitative approach method with a qualitative descriptive design. The research subjects were students of grade V at one of the private elementary schools in Bandung with a total of 29 students. The research data was collected with a test instrument. There were five test questions used to obtain data on the student conceptual understanding.

The data obtained quantitatively were analyzed by finding the average and percentage in each aspect studied and connecting them with previous studies.

## RESULTS

The results of the study were in the form of documentation and student learning outcomes related to the conceptual understanding on water. There were five essay questions given to students at the end of the lesson. Each question measures a different dimension of knowledge. The results of each student conceptual understanding test are different according to the students' abilities.

Conceptual understanding analyzed includes understanding concepts in terms of the dimensions of knowledge, namely factual, conceptual, procedural, and metacognitive understanding. The following questions were given to

students along with the categorization of their knowledge dimensions, namely: 1. What is water/rain cycle? (factual); 2. How does acid rain occur? (procedural); 3. Why is there a clean water crisis in some areas (meta cognitive); 4. What can be done to save the use of clean water? Mention 3 attempts! (Conceptual); 5. What are the benefits of water for human, animal, and plant life? (Conceptual).

The score given to students is guided by the following:

0 = The student does not answer the question

1 = The student answers, but the answer given is wrong.

2 = The student answers correctly, but the explanation is incomplete.

3 = The student answers correctly; the explanation is complete.

By referring to the scoring rules, the student learning outcomes are obtained as follows.

**Table 1.** Percentage of Student Score

| Jumlah Siswa | Jumlah Nilai | Persentase (%) |
|:---:|:---:|:---:|
| 4 | 14 | 13.79 |
| 6 | 13 | 20.69 |
| 10 | 12 | 34.48 |
| 5 | 10 | 17.24 |
| 1 | 11 | 3.45 |
| 1 | 8 | 3.45 |
| 1 | 6 | 3.45 |
| 1 | 5 | 3.45 |

From **Table 1**, it is known that 4 students with a total score of 14 obtained a percentage of 14.79%, 6 students with a total score of 13 obtained a percentage of 20.69%, 10 students with a total score of 12 obtained a percentage of 34.48%, 5 students with a total score of 10 obtained a percentage of 17.24%, meanwhile each student obtained a total score of 11, 8, 6, and 5, each obtained a percentage of 3.45% of the 29 total students who answered the evaluation questions. From table 1, it can be concluded that the highest score obtained by students is 14 with 4 students, while the lowest score obtained by students is 5 with 1 student.

If the data are grouped according to the truth and completeness of the students answers in accordance with the scoring guidelines, the following results will be obtained.
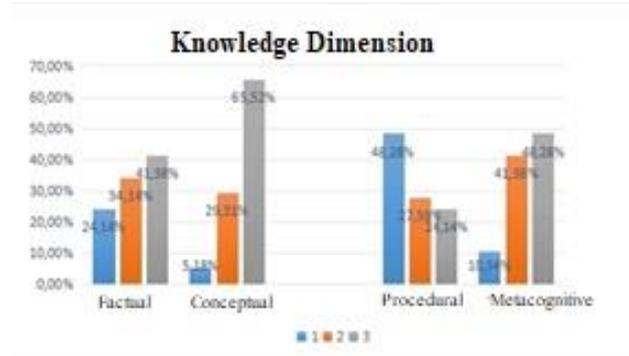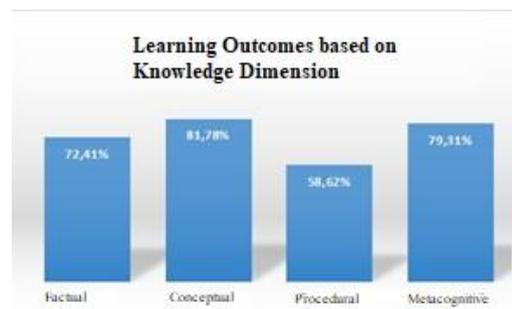
**Figure 1.** Knowledge Dimension According to Scoring

Based on **Figure 1**, it can be seen that generally students answered correctly and completely on the knowledge dimension with a percentage of 65.52%, then continued with the metacognitive knowledge dimension with a percentage of 48.28%, the factual knowledge dimension of 43.38% and the procedural knowledge dimension of 24.14%. Meanwhile, the highest percentage of students answered incorrectly, namely the procedural knowledge dimension with a percentage of 48.28%, followed by the factual knowledge dimension of 24.14%, metacognitive of 10.34%, and conceptual of 5.18%. This percentage is obtained by grouping students' scores according to their knowledge dimension and then adding up the number of students who obtain a score of 3, a score of 2, a score of 1, then dividing by the total number of students, which is 29 students.

Furthermore, the data are analyzed based on the percentage of student learning outcomes in accordance with the dimensions of knowledge. The data are in **Figure 2**



**Figure 2.** Learning Outcomes According to Knowledge Dimension.

Based on **Figure 2**, it can be seen that the understanding of students concepts in terms of student learning outcomes according to the dimension of knowledge, the conceptual knowledge dimension gets the highest percentage of 81.78%, followed by the metacognitive knowledge dimension with a percentage of 79.1%, the factual knowledge dimension of 72.41 %, and the procedural knowledge dimension with the lowest percentage is 58.62%. The percentage of data obtained

by adding up the total score of all students according to the dimensions of their knowledge then divided by the highest score of 87.

Based on the results of this study, some students have good factual, conceptual, procedural, and meta-cognitive knowledge.

## DISCUSSION

Conceptual understanding is the result of a person learning process so that he can understand, define information in their own language and one's ability to interpret the knowledge he has (Pani, 2019). Conceptual understanding that a person has is seen from the knowledge competence he has. Knowledge assessment is used to measure students abilities which include the dimensions of factual, conceptual, procedural, and metacognitive knowledge (Jeprianto, Ubabuddin, & Herwani, 2021). These four dimensions of knowledge are contained in the 2017 revised 2013 Curriculum, meaning that these four dimensions of knowledge must be possessed by Indonesian students (Harosid, 2019).

The implementation of the RADEC model in the research of (Pohan, Abidin, & Sastromiharjo, 2021) has a positive effect on students reading comprehension skills, namely the RADEC learning model can help students get used to reading or improve reading literacy, open students horizons, and broaden students information or insight before learning activities begin. In its implementation to this study, in terms of the knowledge dimension, the RADEC model seen from all learning outcomes grouped according to the knowledge dimension, the results showed that the RADEC model is good for helping students instill the conceptual, meta cognitive, and factual knowledge dimensions because they obtained a percentage of 81.78%, 79.31%, and 72.41% %. The dimension of procedural knowledge obtained a percentage of 58.62%, meaning that the RADEC model is quite good in instilling the dimensions of procedural knowledge. Categorization Criteria that adopted from (Harun & Fitria, 2020) are in **Table 2**.

**Table 2.** Criteria for Learning Outcomes

| No. | Interval | Category |
|-----|----------|----------|
| 1. | 86% ≤ score ≤ 100% | Very Good |
| 2. | 71% ≤ score <85% | Good |
| 3. | 56% ≤ score < 70% | Pretty Good |
| 4. | 41% ≤ score < 55% | Not Good |
| 5. | 0% ≤ score < 40% | Poor |

Conceptual knowledge is knowledge about the basics of a science (Evita, 2020). Factual knowledge is in the good category, meaning that students' knowledge of water material with a focus on how to save clean water and the

benefits of water for human, animal, and plant life in classifying it both to relate events to observations and summarize them specifically. Good students cover classification and category knowledge (Fatmawati, 2013).

Metacognitive knowledge is knowledge that includes strategic knowledge (Solihat, Juwaedah, & Rahmawati, 2018). Linked to this research, metacognitive knowledge is in the good category, meaning that students knowledge of their knowledge in relation to cognitive is good, seen from the way students can find out certain aspects of the causes of the clean

water crisis (Ariyana, 2020). Factual knowledge is in the good category, indicating that the concepts that students have regarding the water cycle are good to help students understand the field (Ari Widodo, 2005).

Procedural knowledge is knowledge that students have of a work step or procedure (B. Setiawan & Oktaviani, 2018). Procedural dimension knowledge of students is in the fairly good category, meaning that the students ability to write down the stages of the cycle procedure is still at a moderate stage.

**Table 3.** Table of Individual Student Score.

| Jumlah Siswa | Jumlah Nilai | Persentase (%) |
|---|---|---|
| 4 | 14 | 93.3 |
| 6 | 13 | 86.7 |
| 10 | 12 | 80 |
| 5 | 10 | 66.7 |
| 1 | 11 | 73.3 |
| 1 | 8 | 53.3 |
| 1 | 6 | 40 |
| 1 | 5 | 33.3 |

The minimum completeness criteria used in the school is 80. Viewed from the individual student learning outcomes in **Table 3**, the number of students who complete is 20 people, and students who do not complete are 9 people. The lack of maximum student learning outcomes is not entirely due to the failure of the implementation of the RADEC model carried out by the teacher. Viewed from the score of integrity and mastery of students concepts through WhatsApp groups on the water cycle material, the RADEC model has a very good role in influencing the integrity and mastery of students concepts (Wahyuni, Sudin, & Sujana, 2020). From the previous

research, it can be seen that some students who did not pass it could be caused by the learning style factor that was carried out because in its implementation, the RADEC model had a very good influence. Online learning makes learning more challenging.

During the learning activities, there were still students who did not heed the teachers instructions, both when the teacher asked questions about the material and the teacher asked the students to turn on the camera. There are many problems that occur in online learning, the results of research on the Problems of Online Learning in the

Student Perspective are that the internet connection that is owned is not supporting, the online learning media provided often have errors, the limited internet quota they have, boredom and lack of focus for students while studying (Arif Widodo & Nursaptini, 2020). From the results of this study, the same thing could happen to elementary school students. The impact of Covid-19 on the implementation of online learning in elementary schools is considered quite good if teachers, students, and parents can work together in learning at home (Dewi, 2020).

## CONCLUSION

Based on the research problems, the conclusion of this research is the analysis of concept solving for the fifth grade of Elementary School Students on Water Material through the RADEC learning model, which is seen from all learning outcomes grouped according to the dimensions of knowledge, the results show that the RADEC model is good for helping students instill the dimensions of conceptual knowledge, meta cognitive, and factual with percentages of 81.78%, 79.31%, and 72.41%. The dimension of procedural knowledge obtained a percentage of 58.62%, meaning that the RADEC model is quite good in instilling the dimension of procedural knowledge.

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