Enhancing Sundanese students’ creative thinking skills using ICARE model on physics concepts: A Rasch analysis approach

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Abstract. Creative thinking skills are vital in physics knowledge as in physics knowledge equal through investigation arrangements on attentions accomplishment subsequently sensing, articulating difficulties, gathering information, dispensation and seeing information, and concluding. This study drives to enhance Sundanese students’ creative thinking skills on physics by the ICARE model through Rasch Analysis. The investigate technique used a pre-experimental technique with one group pretest-posttest design for ten grade pupils (10 boys and 12 girls) and exploitation Rasch analysis to portion the person consistency with bubble chart and variable wright map. The instrument was based on indicators by Torrance. Informations were composed through pretest and posttest to amount creative thinking skills and person consistency on students. The outcomes displayed that ICARE model influenced creative thinking skills through the middling score of 0.61 characterized as intermediate. It can be decided that ICARE model is one of the erudition models that can stimulus and enhance students’ creative thinking skills on physics ideas.

1. Introduction
The period of expertise and globalization not solitary simplify society in the substance of exploitation then similarly challenges social through encounter and approximately complications. The growth of expertise was collective the deviations of social lifetime swiftly. Subsequently, everyone must be able to explaining all the complications in quotidian lifetime. Creative thinking skills are essential so as to answer the intricate complications in the imminent [1].

Pretentious that pupils consume a probable to be creative, formerly around are various behaviors to get up, inspire, advance, and admission the students to the creative probable. A teacher recommended arranging the appropriate formation and application method in order to enhance the students’ creativity. Purportedly, creative thinking skills must be experienced at all heights of education from principal schools to colleges to accomplish the areas in agreement through the strains of the informative program [1,2].

The basis of the inspiration is in somebody who understands that around is roughly incorrect, fewer, then secretive. Protuberant structures of the creative individual that boy or girl is be capable of realize a problematic though the others do not. On the divergent, the individual that is impotent to realize the problematic late topics can be characterized in place of not inspired creature [3].

Creative thinking skills is the assistances to reason of various potentials; practice numerous strategies; to practice dissimilar argument of sight; to reason of somewhat new and advanced in order to attendant the educators in producing and choosing substitutions [4]. Confidently, with virtuous
thoughtful assistsances pupils can inspire their creative thinking skills to answer complications in routine by using their information or education [5].

Indonesia is famous to have many tribes and cultures [6]. Confidential 15 major tribes in Indonesia they described that five of the fifteen major tribes prompted from the Island of Java one of which was the Sundanese, the second-largest tribe after the Javanese [6]. Therefore, the discussion of the Sundanese is an exciting entity to discuss, specifically in the ground of instruction [6].

Instruction will be improvement practice the ICARE typical (introduction, connection, application, reflection, extension) education climaxes the structures of: dynamic, stimulated, and enjoyable [2]. The Introduction accomplishment defenses an explanation of the goals and services that students will comprehensive subsequently the education happenings are connected; Connection actions contain students in a system to make students to be essential to comprehensive education purposes connected to veracities, concepts, principles/guidelines, perceptions, and physics procedures [2,3,4]. Knowledge belongings that are related by students converse the awareness of spirited instruction in addition agreeable, watching videos, replications, and additional media; In Application arrangements, pupils behavior investigational schedules to expression authenticity observations accomplished subsequently connection step. In Reflection arrangements, students suggestion an explanation of the opportunity to which realizations have or have not been reached or unstated by students associated to resilient of awareness completed investigational arrangements; Extension arrangements, students can design investigational arrangements completed simple through the alike principles to recognize the concepts that have been achieved [2,4].

Rasch investigation was principally completed through Georg Rasch in 1960 to examination structure in intelligent by dual categories of deprecations, a trouble for a discrete item and capability for each individual [5,6,7]. Rasch investigation is arithmetical technique for expresses submission of individuals with examination items that can be unstated by way of a psychometric device in public discipline [5,6].

Rasch analysis can presently be used in the direction of the procedure of evolving a examination and is a influential psychometric tool. The Rasch analysis is a stochastic type that accords raw examination essentials to be visible to a direct variation to produce an identical score that detects student capability and item difficulty on a standard logit scale. Rasch analysis can be used for belongings of dichotomous or polytomous. Nevertheless, the polytomous answer construction may be additional suitable in numerous conditions [6].

Founded on that contextual, the examine determinations enhancing of creative thinking skills with ICARE model at Sundanese students’ using Rasch analysis approach. The enhancing creative thinking skills of ICARE is very vital because telling to exam the pupils' creative thinking skills are tranquil not often to discovery. This tool creative thinking skill is settled founded on Torrance Indicator are fluency, flexibility, originality, elaboration. This research has never been carried out in the Sundanese tribe area before.

2. Method
In this learning, the applied technique of investigate pre-experimental strategy with one group pretest-posttest strategy. This Explore including 22 pupils holds 10 boys and 12 girl of ten grade of senior high school in small village Sundanese tribe at Setianagara. Ensuing the structure of one-group pretest-posttest strategy is exposed in Figure 1.

| O1 | X | O2 |
|----|---|----|
| Pre-test | Treatment | Post-test |

**Figure 1.** One Group Pretest-Posttest Strategy
The information investigation process is Rasch model for degree individual dependability and standardized N-gain to appreciate the increase in pupils’ creative thinking skills. Hake's explanation that to adjust the standardized N-gain the consequential intention tin be used [10].

\[
< g > = \frac{< S_{post} > - < S_{pre} >}{100 - < S_{pre} >}
\]

Formerly to adjust the level of creative thinking accomplishment of N-gain students are changed as in Table 1.

**Table 1. Marking Conditions of N-Gain**

| N-Gain Score     | Clarification |
|------------------|---------------|
| \( g \leq 0.30 \) | Low           |
| 0.30 < \( g < 0.70 \) | Intermediate |
| \( g \geq 0.70 \) | High          |

The means that secondhand is to investigate the creative thoughtful indicator based on Torrance creative thoughtful aspect [8], the sequencer that secondhand and assumed complexity. The creative thinking gauges that practical definite in Table 2.

**Table 2. The comparative of creative thinking and indicator that used**

| Creative Thinking Field | Indicator                             |
|-------------------------|---------------------------------------|
| Fluency                 | Smoothly expresses ideas               |
| Flexibility             | If given a problem usually think of a variety of different ways to solve it |
| Originality             | Able to give birth to unique new expressions |
| Elaboration             | develop or enrich the ideas of others |

Example of creative thinking question in Figure 2.

**Fluency**

From the picture below, which ball has the greatest weight force? Describe the order you created

![Figure 2. Examples of creative thinking question](image)

The periods of ICARE model are:
### Table 3. Phase of ICARE model

| ICARE Phase | Description |
|-------------|-------------|
| **Introducing** | The instructor grants pupils around the singularity proposed for related knowledge. The teacher worried to express the new evidence concluded approximately formerly predictable finished the students temporarily expertise. |
| **Connecting** | At this stage students apply learning materials such as carrying out practicals or taking data or doing assignments. |
| **Applicating** | At this stage students reflect on what they have not understood from the material being studied. |
| **Reflecting** | The extension step is an achievement where the teacher gives assignments at home to add experience to provision and spread knowledge. |
| **Extending** | |

### 3. Result and Discussion

Students’ creative thinking skills taster to get eminence of tool counting individual dependability, element dependability, cronbach alpha, validity, gender item functioning, and difficulty level [6]. Focusses who used the provisional of these belongings are the 10th-grade pupils one of the senior High School at Setianagara. The subsequent responsibility is connected concluded a dependability individual with the Rasch model in Figure 3.

![Figure 3](image)

**Figure 3.** Immediate of Dependability Person with the Rasch Model

Rendering to Figure 3, it can be realised of the individual dependability .65 and .71, which the dependability for individual in intricate in the ‘good’ class. Moreover, value of contact among the person and items displayed by Cronbach Alpha value (KR-20) of .72 is complicated in the ‘good’ class. This examination has completed concluded a Bubble chart on WINSTEPS 4.4.3, by means of the tackles of Rasch examination. Examination of these phases can be exposed in Figure 4.
Figure 4. Immediate of Dependability Person with the Rasch Analysis with Bubble Chart

Conferring to the figure 4 is a posttest students, it can be show that the pupils with the aptitude of 22 person, the representation ‘M’ (means boy) and the representation ‘F’ (means girl) displays that the number of the pupils’ 14 M and 01 F are the highest creative thinking capabilities. Whereas pupils with the deepest creative intelligent are the number 15 F and for the toughest element trying is S7. The analysis has completed through a variable wright maps seen pretest and posttest students can be exposed in Figure 5

Figure 5. (a) Distribution student at pretest, (b) Distribution student at posttest
Figure 5 (a) shows the results of the students' pretest, it can be seen that S5 (question 5) is the most difficult question while the lowest questions are S2 and S4. In the pretest results, 14 M has the highest reliability and the lowest is 15 F. In Figure (b) is the posttest result S7 is the highest question while S5 is below it and the lowest is still S2 and S4 questions and for students, 15 F is the lowest. On the pretest results, 01 F is lower than 14 M but in the posttest results, it is parallel to 14 M. On the pretest results, 10 M and 08 M are lower, while in the posttest results 10 M and 08 the level of reliability increases. However, at 04 F and 15 F, the pretest results were higher than the post-test results.

**Table 4. Students’ Creative Thinking Skill of Typical proportion**

| Typical Score | N-Gain | Category |
|---------------|--------|----------|
| Pre-test      | Post-test |        |
| 22,29         | 69,79   | 0,61     | Intermediate |

N-Gain (g) for characteristic creative thinking skills are offered in Figure 6.

![N-gain](image)

**Figure 6. The middling value of creative thinking skills**

Table 4 show the collective N-Gain outcomes expression enhancement pupils' creative thinking skills with an regular score of 0.61, characterised by way of the intermediate, this finding is supported by previous research held [3], which stated that creative thinking skills average score by way of the intermediate. It resources the ICARE container enhancing pupils' creative thinking skills by a pretty intensification class. Concurrence by deliberate through some examination which circumstances that with ICARE model can enhancing pupils' creative thinking skills.

Grounded on Figure 6, the highest value is the fluency aspect with a value of 0.65. Furthermore, the second highest value is originality with a value of 0.62. The difference between the two aspects is only 0.3. Meanwhile, the lowest aspect is Elaboration with a value of 0.57. Creative thinking skills castoff by means of pupils in learning is still simple and not too complex compared to the other four indicators of creative thinking skills.

4. **Conclusion**

Operating the ICARE model container enhance the creative thinking skills Sundanese students’ with Rasch analysis approach on physics idea in the intermediate class by a charge of <g>=0.61. The outcomes expression that the Creative Thinking Skills with ICARE Model used Rasch analysis approach container be used as a reference for added investigate through academics along with through educators so as to perform the learning development also quantity creative thinking on physics ideas.
5. Acknowledgments
Researchers take DRPM Direktorat Jenderal Penguatan Riset & Pengembangan Kemenristekdikti who has provided research capitals to carry out research in order to development education.

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