THE ROLE OF SCIENCE IN THE FORMATION OF UNUSUAL THINKING SKILLS IN YOUR STUDENTS

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Abstract: The capacity for creative thought is one of the 21st-century skills pupils need. The capacity for creative thought is an outlet of motivation, power, and strength for inventing, studying, and analyzing answers to the technological revolution. 4.0. The current research describes the capacity for creative thought among junior high school science students. One area that calls for the use of original thought is science. Descriptive analysis was the strategy employed in this investigation. Through interviews, observation logs, and a test, data were gathered. One hundred thirty-eight adolescents from four separate junior high schools served as the study's subjects.

According to this study's findings, pupils with high scores comprise 36 students, those with medium levels of cognitive ability are 62, and those with low levels of cognitive ability are 40. The percentages of each indicator on the innovative test consisted of having fluid thought (85%), imagining actually (43%), thinking (72%), and perception of development (60%), whereas on the observation sheets, were thinking fluently (76%), thinking originally (35%), and lean thinking (42%) and flexible (52%).

Keywords: Science education, innovative thinking, innovation, interaction, and collaboration are all aspects of the 21st-century dilemma.

INTRODUCTION

Thinking creatively is crucial since it contributes to human power in advancing scientific and technological research, development, and discoveries. Another definition of creative thinking is the capacity for problem-solving and the formation of a rationally organized mode of thought about the subject matter of knowledge. A growing capacity for creative thought will lead to the generation of ideas and the discovery of linkages between concepts, imagination, and various viewpoints. An increasing capacity for creative thought will lead to the age of ideas and the discovery of connections between concepts, visions, and multiple views. Students' limited capacity for creative thinking will make it challenging to respond to teacher-posted questions or solve problems.

One of the abilities pupils need in the twenty-first century is thinking creatively. The 4Cs (communication, collaboration, critical thinking, and creativity) are frequently used to refer to 21st-century talents. The ability to think creatively helped navigate the era of the fourth industrial revolution. Science and technology's swift and significant progress distinguished the fourth industrial revolution. To take part in the industrial

revolution 4.0 and face the challenges of the twenty-first century, adaptable people with new ideas are needed. Abundant resources and the ability to think creatively are necessary for a country to be remarkable.

Integrating science learning (integrative science) is used when teaching science in high school. Integrated learning aims of science to develop scientific process skills (science process skills), creative and critical thinking abilities, and a scientific mindset. People who can think creatively should be able to study science. Thinking creatively is thinking and intending to create something new insights. Creative thinking is often considered a mental activity that may result in thoughts, ideas, knowledge, understanding, and discoveries. The ability to create something new from different views, facts, opinions, experiences, or knowledge held inside the human mind is limited owing to the signs and execution.

The following is an example of a cognition domain-related indication of creative thinking abilities: 1. Smooth thought, or (a)—many creative suggestions for fixing problems; b. Answer a question with several different responses; (c). Offer several approaches or ideas for different tasks, and (d) work more quickly and efficiently than other kids; 2. Be adaptable that is, (a). Create various iterations of resolving issues or responding to a query; (b). being able to approach a subject from a new angle, and (c). Describe a notion in several ways; 3. Be creative that is, (a). Give a response distinct from the norm and a reasonably new solution to a particular challenge; Create novel combinations of components or pieces (b); 4. Think carefully (elaborate), which is (a). Develop or improve on the ideas of others, and (b). To enhance the quality of a concept, add, arrange, or specify it; 5. Value-based (evaluative) thought, or (a). able to determine if a question is true or whether a solution to a problem is true (justification); b. It can inspire a solution and enable proper implementation, in addition to (c). Describe a factor that can be taken into consideration while making a choice.

Every student has a unique capacity for creative thought. According to the justification provided, the significance of innovative thinking abilities in addressing 21st-century challenges like The fourth industrial revolution makes it evident why academics were urged to study the profile of junior high school pupils' capacity for creative thought.

METHOD

With quantitative data, this study employed a descriptive-analytic research style. Tests, observation logs, and interviews were used to collect data and other methods. This study aimed to assess high school pupils' capacity for creative thinking when learning science. Data from observation sheets are collected during the learning process. After learning, tests and interviews are held.

The interviews are focused on science professors and students from high schools. One hundred twenty-six pupils were the samples utilized. The sampling method applied is an unintentional sampling method. A sampling technique is an accidental sampling approach.

To calculate the rate of students' creative thinking abilities on each indicator, the student's responses are analyzed by the percentage of the average scores achieved on each of the arrows used in this study. Table 2 interprets the movements of students'

creative thinking skills, including whether they are good, good, sufficient, terrible, or bad.

Table 2. Interpretation of Students' Creative Thinking Levels

Percentage (%)	Interpretation
81-100	Very good
61-80	Good
41-60	Sufficient
21-40	Bad
0-20	Very bad

RESULTS AND DISCUSSION

A 5-item essay exam was one of the tests employed in this investigation. This essay exam has been modified to reflect the signs of creative thinking that are fluent, flexible, original, and elaborative that are employed in research.

Table 3 presents an illustration of the essay question.

Table 3. The Example for Essay Question

Aspect	Indicators of Creative Thinking Skill	Question	Answer and Scoring
Flexibility	a. Produce variations in the idea of solving problems or answering a question; b. Able to see a problem from a different perspective c. Present a concept in different ways	At night you have trouble sleeping because you feel hot. How do you try to avoid the heat in the room so you can sleep?	1. Turn of the lamp 2. Turn on the AC 3. Take a bath 4. Change clothes 5. etc 4 = Give answers in more than one way (diverse), the acquisition process is correct 3 = Give answers in more than one way (various) but the results are wrong because there are errors 2 = Provide answers in one way, the acquisition process 1 = Giving answers is only one way but giving wrong answers 0 = Not answering or giving answers in one or more ways but all are wrong

The information above is then broken down depending on each observation sheet and creative thinking skill indicator utilized in this study. Table 5 displays the average percentages for each sign of creative thinking abilities based on the hands that have been decomposed.

Table 5. Mean Score of Each Indicator of Creative Thinking Skills from Test

Indicators of Creative Thinking Skills	Percentage (%)	Interpretation
Fluency	82	Very good
Flexible	61	Good
Original	38	Bad
Elaboration	55	Sufficient

By delving further into components of creative thinking, teachers may help students discover the truth in an issue or situation and develop arguments that can be used to support their conclusions. While the ability to think creatively and flexibly can be understood as the ability to provide different solutions to issues or answers, it also means that pupils can evaluate a problem or question from several angles. Flexibility in thought produces results that are marginally superior to elaboration. When answering issues, students can come up with many different solutions instead of pupils who must discover the correct solution to every problem or topic. While most students can offer a variety of replies, they frequently need help choosing the appropriate account for those answers.

The most crucial aspect of novelty or originality is that it differs from other things or things that have already been created; fluency is exhibited by how quickly children develop ideas, responses, solutions, and other ideas in response to questions, situations, and inquiries. Flexibility demonstrates the efficacy of ideas utilized to address an issue.

CONCLUSION

The study's findings and analysis might lead to an answer on the creative thinking talents of high school pupils. According to the study's findings, 18 students scored well, 54 students demonstrated moderate thinking ability, and 51 students showed poor creative thinking abilities. Thinking fluently (82%), thinking initially (38%), thinking flexibly (61%), and thinking of elaboration (60%) were the percentages of each sign on the creative thinking exam, whereas thinking fluently (71%), thinking originally (34%). Lean thinking (60%) was the percentage on the observation questionnaires.

This study is anticipated to be considered by other researchers as they explore deeper and look for solutions to the disparities in creative thinking abilities. This study's findings are expected to help improve education, particularly science education. Developing students' creative thinking abilities is possible through problem-based learning and projects relevant to daily life while paying attention to the advancement of science and technology as a preparation for the working world.

REFERENCES

Arikunto, S. (2010). Prosedur Penelitian Suatu Pendekatan dan Praktik (PT Rineka Cipta, ed.). Jakarta.

Azhari. (2013). Peningkatan Kemampuan Berpikir Kreatif Matematik Siswa Melalui Pendekatan Konstruktivisme Di Kelas VII Sekolah Menengah Pertama (SMP) Negeri 2 Banyuasin III. Jurnal Pendidikan Matematika, 7(2).

Bahriah, E. S. (2012). Pengembangan Multimedia Interaktif Kesetimbangan Kimia Untuk Meningkatkan Literasi Sains Siswa.

Bjorner, T., Kofoed, L.B., & Pederson, J. R. B. (2012). Perception, Creative in Project Work- Student's Barriers, And barriers. International Journal of Engineering Education, 28(3), 545–553.

Carin, A.A. & Sund, R. . (2014). Active and Peer Learning in STEM Education Strategy. In Science Education International (Vol. 25). Columbus: Merrill Publishing Company.

Chiappetta, E. L. & T. R. K. (2010). Science Instruction in The Middle and Secondary Schools: Developing Fundamental Knowledge and Skills. United States of America: Pearson Education Inc.

Lou, S., Chung, C., Dzan, W. & Shih, R. (2012). Construction of a creative instructional design model using blended, Project-Based Learning for college students. Innovative Education, 3(7), 1281–1290.

Mahmudi, A. (2010). Mengembangkan Kemampuan Berpikir Kreatif Siswa Melalui Pembelajaran Topik Pecahan. Seminar Nasional ALjabar, Pengajaran Dan Terapannya. Yogyakarta: FMIPA UNY.

Munandar, U. (2009). Mengembangkan bakat dan kreativitas anak sekolah. Penuntun bagi guru dan Orang Tua. Jakarta: Grasindo.

Nehe, M., Surya, E., Syahputra, E. (2017). Creative Thinking Ability to Solve Equation and Nonequation of Linear Single Variable in VII Grade Junior High School. IJARIIE, 3(2).

Nurhamidah, D., Masykuri, M., Dwiastuti, S. (2018). Profile of senior high school students' creative thinking skills on biology material in a low, medium, and high academic perspective. IOP Conf. Series: Journal of Physics: Conf. Series. IOP Publishing.

Prayekti. (2006). Penerapan Pendekatan Sains Teknologi Masyarakat pada Pembelajaran IPA di SD. Jurdik & Hum, 9, 1–7.

Prusak, A. (2015). Nurturing Students' Creativity Through Telling Mathematical Stories. The 9th Mathematical Creativity and Giftedness International Conference Proceedings. Romania: Sinaia.

Rashid, T., & Muhammad, H. (2016). Technology Use, Self-Directed Learning, Student Engagement, And Academic Performance: Examining The Interrelations. Computers in Human Behavior, 63, 604–612.

Riduwan. (2010). Dasar-Dasar Statistika. Bandung: Alfabeta. Silver, E. A. (1997). Fostering Creativity through Instruction Rich in Mathematical Problem

Solving and Thinking in Problem Posing. USA: Pittsburgh. Siswono, T. Y. . (2011). Level Student's Creative Thinking in Classroom. Academic Journal,

6(7), 548–553.

Sugiyanto, F.N., Masykuri, M., and M. (2018). Analysis of senior high school students' creative thinking skills profile in Klaten regency. IOP Conf. Series: Journal of Physics: Conf. Series. IOP Publishing.

Torrance, E. P. (1965). Scientific Views of Creativity and Factors Affecting Its Growth. Creativity and Learning, 94(3), 663–681.