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A Teachers' Creativity in the Era of the 5.0 has the Potential to Significantly Enhance Students' Learning Outcomes and Argumentation Skills: *A Needs Analysis with Rasch Model*

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ABSTRACT

This research is a preliminary research on the correlation of teacher creativity in the era of 5.0 on chemistry learning achievement and students' argumentation skills which will be continued into a more complete research. The ultimate goal to be achieved from this research is to find out the correlation of teacher creativity on chemistry learning achievement and students' argumentation skills. This research uses a descriptive analysis method, which is research that uses descriptive data results obtained from existing data. This type of research conducted by collecting several sources relevant to the topic discussed in order to obtain valid data to support this research. Teacher creativity during learning is proven to improve chemistry learning achievement and students' argumentation skills. Chemistry is an abstract, real, tiered science and cannot be learned directly, so there needs to be the right technique in learning chemistry. The result of the research showed that the teacher creativity in designing learning, choosing the right methods and media can make it easier for students to understand the material and help students improve their argumentation skills.

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1. INTRODUCTION

Education is a teaching effort in guiding and training someone to be better obtained formally or informally(UNDANG-UNDANG REPUBLIK INDONESIA NOMOR 20 TAHUN 2003 TENTANG SISTEM PENDIDIKAN NASIONAL DENGAN RAHMAT TUHAN YANG MAHA ESA PRESIDEN REPUBLIK INDONESIA, n.d.). Education itself aims to improve and develop one's skills in achieving life goals in the future(Hjerm et al., 2018). School is a formal education to educate and teach students to have knowledge and skills that will be applied in everyday life (Sola, 2022). Along with the rapid development of Science and Technology (IPTEK), students are expected to be able to become a productive, creative citizen, able to contribute to the life of the nation and state and be able to compete in facing the challenges of modernization. Teachers play a very important role in helping students become skilled and in achieving maximum life goals (Manning et al., 2017). Therefore, teachers are required to be skilled and have teaching creativity that can affect student interest in learning.

Chemistry is a subject at the Senior High School equivalent school level that must be taken by students majoring in science. In addition to science majors there are also certain majors that study chemistry. Chemistry is an elaboration of natural science that discusses the nature, structure, reactions, and changes in matter and the energy that accompanies these changes (Putranto et al., 2020). Chemistry is closely related to human life, so

chemistry needs to be studied.(Munandar, n.d.). With the existence of chemistry, products such as medicine, soap, fertilizer, detergent, make-up, fuel, planes, cars and other products that can be used in human survival are created. A simple example of the benefits of knowing chemistry is that one can know how to maintain a product and can tell whether the product is dangerous or not. Regarding the previous research that was published in reputable journals that conclude that chemistry is very important, it is hoped that there will be a younger generation, especially students who are interested in this learning so that later students can now improve and develop the potential they have in themselves.

Chemistry is abstract, real, tiered and cannot be studied directly so that if it does not use the right methods and media students will have difficulty and feel bored when learning chemistry. Therefore, to better understand chemistry learning, it must be studied completely through three levels of chemical representation. Among them is the macroscopic level, which includes phenomena that can be seen and observed by students, either directly or indirectly, for example through practicum in the laboratory or in everyday life(Musa et al., 2023). The second submicroscopic level is phenomena that cannot be seen directly such as the movement of electrons, particles or molecules, the example can be understood through media such as animated videos. The third level is symbolic which acts as the language of chemical equations so that there are rules that must be followed, for example formulas, diagrams, reaction equations and so on (Yanto et al., 2013).

To address the problem of students' difficulties in learning chemistry, teachers are needed who are able to explain chemical material through the three levels of chemical representation(Sharma & Alvi, 2021). For example, by using examples found in everyday life, and making props such as balls or tomatoes to describe the shape and bonding of a compound(Ardian et al., 2021).

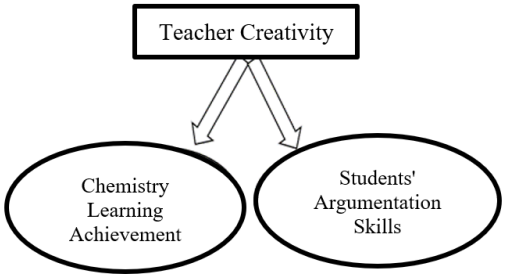

Figure 1. Correlation of teacher creativity with learning achievement and students' argumentation skills.

2. METHOD

The type of research method carried out in this study is descriptive analysis where in this study researchers use descriptive data obtained from existing data. [In this study, researchers tried to find out what the relationship of teacher creativity is to student achievement and what effect it has on students' argumentation skills by analyzing needs using the Rasch Model(Febrina Tarigan et al., 2022). In addition, this research also uses literature study by collecting previous research sources that have relevance to the topic discussed to support the results of the research that has been done. By using descriptive analysis methods and literature study methods, researchers can obtain valid information and data.

The subjects of this study were 20 chemistry teachers in the country and from abroad who were surveyed by filling out a questionnaire via google form. The questionnaire contains the identity of the respondent that must be filled in, questions related to methods, design, learning media, how to create a fun classroom atmosphere, as well as achievements that have been achieved by students and how students' argumentation skills during chemistry learning takes place and in society. The validation in research involves conducting pilot studies, expert reviews, comparisons with previous research, and the theoretical grounding. researcher can ensure that their instrument are reliable and valid.

3. RESULTS AND DISCUSSION

Each subject certainly has its own difficulties (Purwanto et al., 2021). Similarly, chemistry also has various difficulties(Priliyanti et al., 2021) . Some of the difficulties faced in studying chemistry are the lack of basic mathematics owned by students, lack of understanding of chemical concepts, and lack of facilities and infrastructure that can support chemistry learning(Utari & Utami, 2019). Chemistry contains calculations, understanding of concepts, mapping and application (Sappaile, 2019). Therefore, in learning chemistry, students must be able to master basic mathematics, be able to understand chemical concepts and terms, be able to understand the relationship between theory and everyday life (Hartono et al., 2022). Chemistry material also has an interrelationship between other chemical materials, so that in learning chemistry must be sequenced from simple to more complex material (Priliyanti et al., 2021; Ristiyani & Bahriah, 2016). In addition, chemical

material cannot be learned with only one side. A student who only learns theory (for example on electrolyte reaction material) without practicum or without the help of media, then the student cannot understand well how the movement of ions in the solution, how the solution can conduct electricity and how the lights can turn off / dim.

In overcoming these problems, of course, teachers are expected to have creativity in finding out what obstacles and problems their students face and trying to find solutions to these problems (Eichler, 2022). Factors that can affect student learning achievement are the way teachers adjust the classroom atmosphere and how teachers teach. Teachers are required to be good role models as motivators and inspirers for students. Therefore, students must respect the teacher as well as the teacher must respect the students. Teachers can not only give questions to students but teachers must also provide opportunities for students to submit questions / rebuttals related to material that has not been understood (Javorcik et al., 2023; Tolsdorf & Markić, 2018). Students must be trained in presenting material both through individual and group assignments. So that there is a process of exchanging ideas among students and even between students and their teachers. Through this method students will easily understand the material presented by the teacher and students practice how to argue well(Rahayu, 2019). Thus, it can affect learning achievement and students' argumentation skills in chemistry learning (Sari & Nada, 2022).

Student learning achievement is a result or achievement of students in the form of expertise, skills, knowledge, or character achieved through experience, learning or efforts that students have made (Joyce & Showers, 2003). Student learning achievement is influenced by two factors, namely the first internal factor which includes intelligence factors, interest factors, psychological and physical state factors. The second is external factors starting from family environment factors, school factors and teachers as learning resources (F. Monawati, 2018). Students' argumentation ability is an ability that students have in conveying ideas, questions or rebuttals related to what is in their minds to accept a logical statement (Ginanjar et al., 2015; Reynders et al., 2019; Shorey et al., 2021).

3.1. Teacher Correlation to Student Learning Achievement

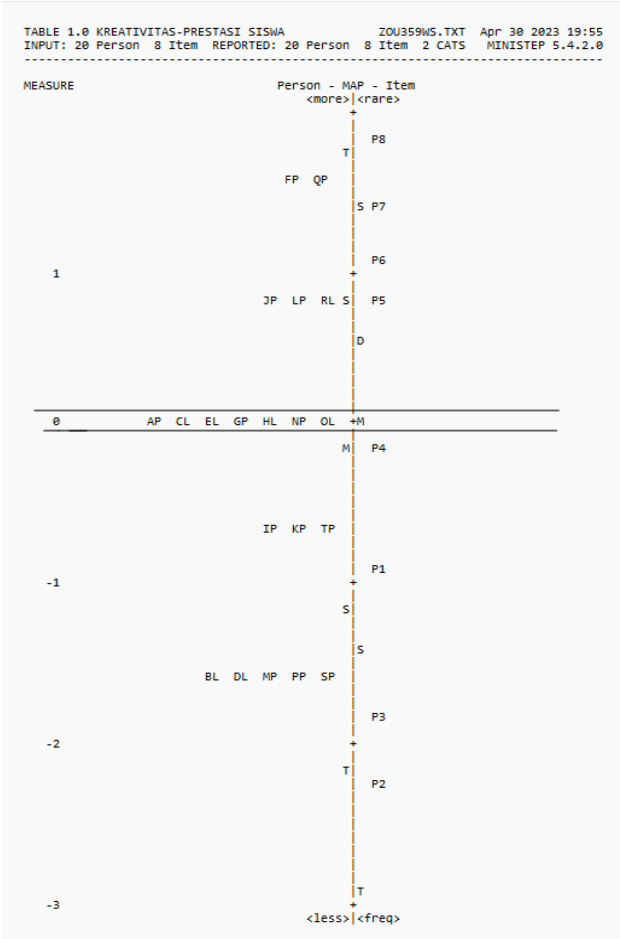

Figure 2. Wright Person Item Map; correlation of teacher creativity on chemistry learning achievement.

Based on the Wright person item map in Figure 2, it can be described as follows.

1) Teachers who are above the logit line are a group of teachers who always apply competencies in the form of their creativity which includes being able to be a role model, being enthusiastic in providing learning, providing motivation and innovation, understanding student characters, utilizing digital learning systems, having intrapersonal abilities, giving students the opportunity to both answer and ask questions, collaboration between teachers and students and being able to make interesting learning media.
2) Teachers who are below the logit line are a group of teachers who rarely or never utilize their creativity competencies. The creativity in question can be in the form of teachers being able to be role models, being enthusiastic in providing learning, providing motivation and innovation,

understanding student characters, utilizing digital learning systems, having intrapersonal abilities, giving students the opportunity to both answer and ask questions, the existence of collaboration between teachers and students and being able to make interesting learning media.

3) There are 5 teachers who always apply creativity competencies including FP, QP, JP, LP and RL.
4) There are 7 teachers who sometimes apply creativity when learning takes place including AP, CL, EL, GP, HL, NP, and OL.
5) There are 8 teachers who rarely or never apply creativity competencies when learning takes place. Among them are IP, KP, TP, BL, DL, MP, PP, and SP.
6) In general, it can be stated that teachers who always apply creativity when learning takes place have students who have high achievement. Meanwhile, teachers who rarely apply creativity when teaching have students with low achievement. So, it can be concluded that the creativity of a teacher during learning has an effect on student achievement.

3.2. Teacher Correlation t0 Chemical Argumentation Skills

Based on the Wright person item map in Figure 3, it can be described as follows.

1) Teachers who are above the logit line are a group of teachers who always apply competencies in the form of their creativity which includes being able to be a role model, being enthusiastic in providing learning, providing motivation and innovation, understanding student characters, utilizing digital learning systems, having intrapersonal abilities, giving students the opportunity to both answer and ask questions, collaboration between teachers and students and being able to make interesting learning media.
2) Teachers who are below the logit line are a group of teachers who rarely or never utilize their creativity competencies.
3) There are 14 teachers who always apply creativity competencies including AP, FP, HL, LP, NP, QP, RL, DL, EL, JP, CL, IP, OL, and TP.
4) There are 2 teachers who sometimes apply creativity when learning takes place including KP and MP.
5) There are 4 teachers who rarely or never apply creativity competencies when learning takes place including GP, PP, BL, and SP.
6) In general, it can be stated that teachers who always apply creativity when learning takes place have students who have high argumentation skills. Meanwhile, teachers who rarely apply creativity when teaching have students with low argumentation skills. So, it can be concluded that teacher creativity in learning is very influential on students' argumentation skills.

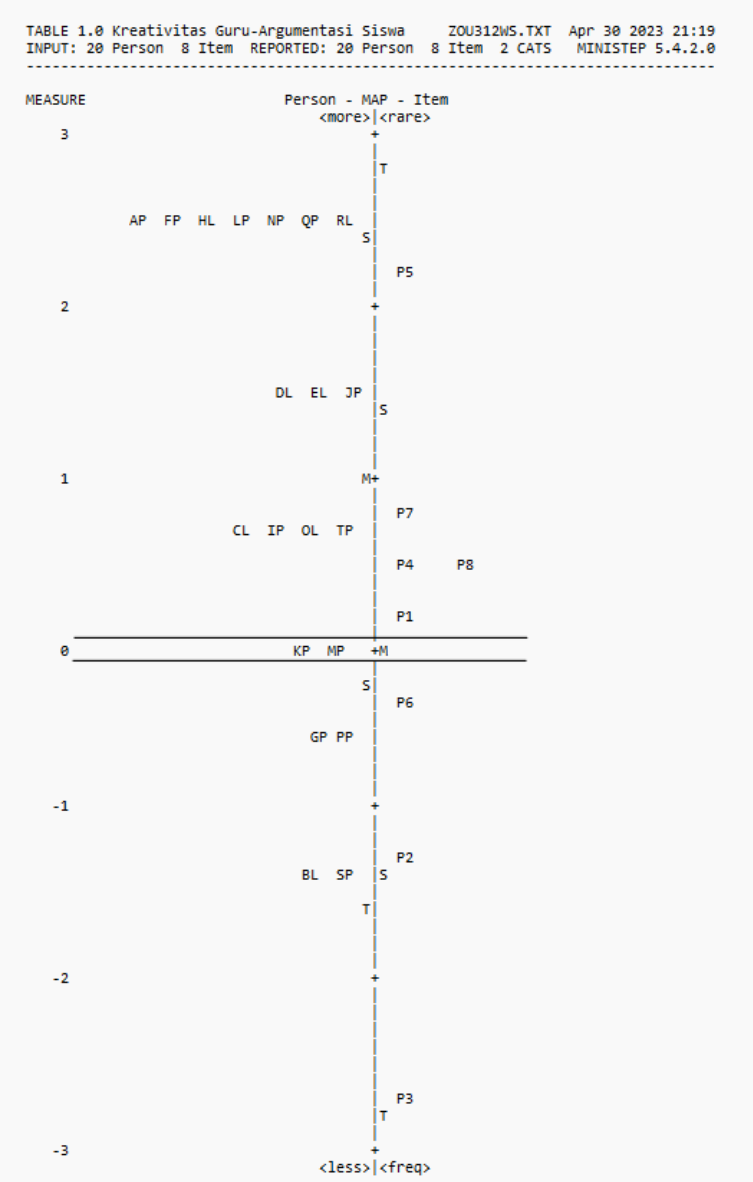

Figure 3. Wright Wright Person Item Map: correlation of teacher creativity on students' argumentation skills with data analysis using the Rasch Model.

In addition to this research, the author also collected some literature studies taken from previous studies to support the results of this study. Referring to the journal "The Relationship between Teacher Teaching Creativity and Student Learning Achievement" written by Fauzi Monawati (M. Monawati. & Fauzi., 2018). The journal explains that teachers who have high teaching creativity will affect the learning achievement of their students (Devi et al., 2018). According to Yani Riyani in the journal "Factors Affecting Student Learning Achievement" explains that there are 4 factors that affect learning achievement. factor 1 teaching and learning process, methods, teaching tools and materials, motivation and evaluation (Riyani et al., n.d.).

Ninda Dwi Cahya Devi, Elfi Susanti VH, and Nurma Yunita Indriyanti in the journal of chemistry and chemical education "Analysis of Argumentation Ability of High School Students on Buffer Solution Material" that students' argumentation ability appears most when learning with the discussion method which is influenced by several factors including opportunities to argue and students' initial abilities. therefore, the teacher plays a very important role in developing this argumentation ability (Devi et al., 2018; Rezieka et al., 2021). In the Journal "Application of Argument-Driven Inquiry Model in Science Learning to Improve Scientific Argumentation Ability of Junior High School Students" written by Wahyu Sukma Ginanjar, Setiya Utari, and Muslim concluded that the application of Argument-Driven Inquiry (ADI) Model can improve scientific argumentation ability. ADI itself is an inquiry learning model that provides opportunities for students to develop laboratory investigation skills accompanied by the development of students' argumentation skills(Ginanjar et al., 2015). In the journal "The Effect of Teacher Creativity in Applying Ice Breaking and

Learning Motivation on Elementary School Student Learning Outcomes" written by Febriandari E. This journal explains that teacher creativity in doing ice breaking during the teaching and learning process has a relationship with student motivation and learning outcomes (Febriandari, 2018).

4. CONCLUSION

Based on the research that has been conducted using descriptive analysis methods which are also supported by literature studies from several valid references, it can be concluded as follows.

4.1 Based on the Wright person item map in Figure 2, it can be concluded that teacher creativity in teaching can affect students' chemistry learning achievement.

4.2 Based on the Wright person item map in Figure 3, it can be concluded that teacher creativity can affect students' argumentation skills.

4.3 From some of the literature studies that have been discussed, it can be concluded that indeed teacher creativity in learning chemistry, both in designing learning, having methods and media is very influential on student learning achievement and argumentation skills.

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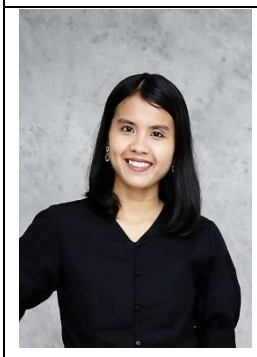

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