Patterns relationships of student's creativity with its indicators in learning optical instrument

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Abstract. This study aims to identify patterns relationships of student's creativity with its indicators in Learning Optical Instrument. The study was conducted at SMPN 2 Sawo, SMPN 1 Jetis, SMPIT Darut Taqwa, SMPN 1 Dander, Bojonegoro and SMPN 3 Plus Al-Fatima. Data analysis used descriptive analysis using the Confirmatory Factor Analysis. Creativity test instruments used have been tested parameters. Creativity indicators used are personal (self-confidence, perseverance), press (spirit, unyielding), process (preparation, incubation illumination, verification) and the product (knowledge, skills). Research Result shows that perseverance and incubation are the highest capabilities and verification capabilities of the lowest. All indicators on student creativity can still be improved. The relationship between creativity with the indicators grouped into a strong, moderate, weak and no relation. Indicators that have a strong relationship (r ≥ 0.50), namely are personal (self-confidence, perseverance), process (illumination). Indicators that have a connection was (0.3 ≤ r ≤ 0.49) are press (spirit), process (verification). Indicators which have a very low correlation (r ≤ 0.1 ≤ 0.29) are press (unyielding), process (preparation), process (incubation), product (skills) as shown in Figure 1. Indicators that do not have a relationship between the creativity of the students with the indicator that is, product (knowledge).

1. Introduction
Thinking consists of critical thinking skills and creative thinking skills both are interrelated, and are part of the performance assessment. Performance Assessment puts students in real contexts so that learning is easier for an authentic destination. Performance behavior demonstrated work habits, industrious, caring for the timeliness and quality of the work, responsibility, able to work together in groups, task management, systematic, attention to safety, all components can be assessed using observational format. Performance assessment is used for testing the performance of students about critical and creative skills. Both of these skills necessary for the development of the student in the future, therefore, a second instrument need to be trained in the skills of teachers and prospective teachers.

Creativity is the result of interaction between the individual and his environment [1]. Someone affect and are affected by the environment in which it is located. Thus changes in the individual or the environment can support or hinder the creative efforts. The implication is that creative ability can be done through education. Creativity is the ability to create/produce something new [1]. Indicators of

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Creativity consists of creative personalities include confidence and perseverance, press or urge include giving spirit and unyielding, the creative process includes the preparation, incubation, luminescence and verification, creative products include knowledge and skills.

According to NACCCE (National Advisory Committee on Creative and Cultural Education on) Creativity is an imaginative activity that produces something new and valuable [2]. Creativity is a form of human self-actualization as the most essential, therein involves the ability of rational, emotional or feeling ability, special talents, the ability of imagination, intuition, and fantasy. Based on these descriptions, creativity means something that comes from human activity to create something new and valuable as a result of interaction with the environment that involves the ability of rational, emotional ability or feelings, special talents, the ability of imagination, intuition, and fantasy [3].

The aims of developing creativity: First, to create a child can manifest itself, self-realization is one of the basic human needs. Second, the ability to think creatively can see a wide range resolution of a problem, expressing thoughts that are different from others without being limited and able to generate many ideas. Third, creativity providing satisfaction to the individual, it is important to note because a person's level of achievement of satisfaction will influence the development of social emotions. Fourth, allow human creativity to improve the quality of life, new ideas as pieces of creative thinking is needed to deal with future challenges [1].

The function of the development of creativity in children, children have the opportunity to meet the needs of expression in its own way, creating something else and new. Activities that produce something this can foster an attitude to continue to busy themselves with creative activity will spur the development of cognitive or thinking skills. In mental health, the development of creativity has a therapeutic value for the expression activity of children can channel the feelings that can cause strain on him, among others, feeling better, disappointed, concerned, who may not be able to say. In the development of aesthetics, in addition to activities that are creative expression, children are also socialized and trained to appreciate the variety of beauty among others the beauty of nature, the painting dances, music.

Creativity is necessary to study the physics [4] [5]. Students will easily capture and apply physics concepts to problem-solving. Many studies suggest that the ability of creativity should be owned by every student and can be developed for each student [6] [7] [8]. To measure the ability of the creativity of students have developed an indicator of the ability of creativity [8]. The indicator has translated into an instrument of creative thinking ability tests [9] [10]. In this initial study to investigate how much the relationship with the students' creativity indicator? The benefits of research that, knowing the most powerful indicator of students' creativity.

Research conducted examines the optical instruments. Optical instrument is a tool that works based on the optical properties, such as reflection, refraction, diffraction, interference, and polarization. Optical instrument divided into two optical instrument natural and manmade optical equipment. Ie an optical instrument natural and artificial optical devices are tools of human vision to observe objects that can not be seen clearly by the eye (Kristanta, 2011). To see small objects and objects farther away, the eyes can no longer see clearly, as well as to the eye is defective or damaged. It is necessary for visual aids, such as glasses, magnifying glass, cameras, microscopes and binoculars, and a periscope. The eyes and the visual aids are called optical instruments.

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Optical instruments that were examined, namely, the eye and its parts as well as the formation of shadows on the eyes. The camera, the camera has a working principle resembles the human eye. Magnifying glass or a magnifying glass, the magnifier in the form of a convex lens used to observe
small objects to make it look bigger and clearer. Microscope, microscope is an optical instrument used for measuring microscopic objects (very small), such as bacteria and viruses. The simplest microscope consists of two positive lenses. Lens close to the object is called the objective lens, while being close to the eye are called the ocular lens. The focal length of the eyepiece is larger than the focal length of the objective lens. So that observation does not tire the eyes, then the eyepiece can be set so that the eye does not need. Binoculars, binoculars or a telescope is an optical instrument used to see objects very far to look more closely and clearly. There are two main types of binoculars, namely binoculars bias, composed of several lenses and binoculars reflection, composed of several mirrors and binoculars lensa. Pada bias, as used objective lenses refract light function. There are two kinds of binoculars bias, ie telescope and binoculars earth. Periscope, periscope is an optical tool that serves to observe objects over long distances or be in a certain angle. Simple shape, in the form of a tube equipped with a mirror or prism at the ends. This prism will reflect light that is parallel to her flat, then arranged so that an angle of 45° to the axis of the tube. Periscope used on tanks and submarines. The navigator on a submarine periscope utilize to observe the movements that occur at sea level. Getting a good shadow and clear, demanding high precision and accuracy, so that the creativity of its users is indispensable.

2. Research Methods
The study was conducted at SMPN 2 Sawo, SMPN 1 Jetis, SMPIT Darut Taqwa, SMPN 1 Dander, Bojonegoro and SMPN 3 Plus Al-Fatima. Data analysis is used descriptive analysis using the Confirmatory Factor Analysis [11] [12]. Creativity test instruments used have been tested parameters. Creativity indicators used are 4P: personal (self-confidence, perseverance), press (spirit, unyielding), process (preparation, incubation, illumination, verification) and the product (knowledge, skills). Measurement of student creativity is part of a performance assessment [13].

3. Results and Discussion

![Diagram](image.png)

Chi-Square=47.90, df=35, P-value=0.07182, RMSEA=0.124

Figure 1. Relationship with Student Creativity indicator
Results in Figure 1 shows that perseverance and incubation are the highest capability and verification capabilities of the lowest. All indicators on student creativity can still be improved. The relationship between creativity with the indicators grouped into a strong, moderate, weak and no relation. Indicators that have a strong relationship ($r \geq 0.50$), personal (self-confidence, perseverance), process (illumination). Indicators that have a connection was ($0.3 \leq r \leq 0.49$), press (spirit), process (verification). Indicators which have a very low correlation ($r \leq 0.1 \leq 0.29$), press (unyielding), process (preparation), process (incubation), product (skills). Indicators that have no connection Indicators that have no connection between the creativity of the students with the indicator that is, product (knowledge) [12].

Components personal indicators, that creative is the "expression" of the uniqueness of the individual in interaction with the environment. Creative expression reflects the originality of the individual. Of unique personal expression, that is expected to create new ideas and innovative products. Therefore, educators should respect personal uniqueness and the talents of their students (do not expect everyone to do or produce the same or have the same interests). Teachers should help students find talent and treasure. Drivers Indicators (press), the creative talents of students will be realized if there are encouragement and support of the environment, or if there is a push in itself (internal motivation) to produce something. Creative talents can thrive in a supportive environment, but can also be inhibited in environments that do not support. In the family, at school, in the work environment, and in society should be recognition and support of the attitudes and behavior of creative individuals or groups of individuals[14].

Of the 10 indicators kreativitas students are the most powerful indicator in the accounts for the ability of students to learn physics kreativitas is perseverance. Perseverance in learning physics has an important role in improving students' creativity seen from the correlation value of 1.16. Perseverance is a component of personality. In measuring components used kreativitas namely diligence questionnaire completed student. Some of the questions given to students are: I am taking seriously the matter physics complete a task; when doing physics experiments, I always try though chances of success are small. Other indicators that have a strong contribution in shaping the creativity of students for student learning is incubation. Incubation allows students to think in advance in an attempt to resolve the problem. Questions concerning incubation indicators are: In the face of a problem in learning physics, I think to look for solutions; I was discussing with a friend first before doing physics experiments; I pay attention to the stages / steps work first before doing physics experiments.

Process (Process), to develop creative, children need to be given the opportunity to be busy themselves actively. Educators can stimulate involve themselves in creative activities, which helped arrange the necessary facilities and infrastructure. In this case what is important is to give freedom to the child to express himself actively with the requirements do not harm others or the environment. The process implicated themselves creatively without the need to constantly or too fast demanding creative product generates meaningful. It will come by itself in a climate of support, accept, and appreciate. It should also be remembered that the school curriculum is too crowded resulted in no opportunities for creative activities. This type of work is monotonous, does not support the students to express themselves creatively. Products (Product), a condition that allows someone to create a product creative Meaningful personal conditions and environmental conditions. The extent to which both push ("press") person to involve themselves in the process (activity, activity) creative. With its talent and creative personal traits, and with the encouragement (internal or external) to be implicated themselves creatively, then the significant creative products will arise. Educators should respect children's creativity products and communicate it to others [15]. For example by showing or display of children's work. It will arouse the interest of children to be creative.

4. Conclusions and Recommendation
Creativity in the dimension of the person is an attempt to define creativity that focuses on an individual or person of individuals who may be called creative, creativity in the dimensions of process is the creativity that focuses on the thought process that led to unique ideas or creative, creativity in
the dimensions of the press is the creativity that emphasizes the press or boost factors, both internal drive yourself a desire and passion to create or implicated themselves creatively, as well as external encouragement of social and psychological environment. Regarding the "press" of the environment, there is an environment that appreciates the imagination and fantasy, and emphasizing creativity and innovation. creativity in product dimension is an attempt of creativity that focuses on the product or what is produced by individuals either something new/original or an elaboration / merging innovative creativity that focuses on creative product emphasis on originality. The 4P indicators developed into 10 indicators of creativity that self-confidence, perseverance, spirit, unyielding, preparation, incubation, illumination, verification, knowledge and skills.

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