The development of marine resources investigative practicum and its effect on creative thinking skills and life skill of vocational school student

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Abstract. The abundant marine resources in Indramayu Regency have not been optimally utilized by the community. Through learning at the Maritime Affairs Ministry, management of marine resources makes it possible to develop. The development of investigative practicum is the development of practical learning design using the 3D method which consists of 3 stages: define, design, develop. The stages of development start from determining the object of research, making a practical investigation design, testing the steps and instruments of investigative practical activities, and testing the effect and effectiveness of investigative practicum design on students’ creative thinking and life skills on a quasi experiment through pre test and post test Non-Equivalent Control Group Design. The research subject was determined by purposive sampling. 40 students from the 10th grade of the Fisheries Product Processing Agribusiness (APHP) study program will be selected to study biotechnology at the Maritime Partnership Vocational School. Data were collected using investigative worksheets, investigative observation sheets, creative thinking skills instruments, life skill tests, questionnaires and interviews to explore students’ responses regarding investigative practicum. The results of this study are the design of the investigative practicum developed that was tested with result of independent sample T-test on the skills to think creatively and life skill of the experimental class differed significantly from the control class. So it can be concluded that the investigative practicum developed has an effect on the skills to think creatively and life skills between the experimental class and the control class. Effectiveness is shown by students' responses of 60% positive towards the application of investigative practicum learning and included in the good category.

1. Introduction
The Ministry of Maritime Affairs and Fisheries (KKP) of the Republic of Indonesia (RI) determines Indramayu as a minapolitan development area based on the KEP No. 35 / MEN / 2013 [1]. Minapolitan is a regional concept of maritime and fisheries development that has the main economic function consisting of production, processing centers, marketing of fishery commodities, services, and other supporting activities [2]. Various maritime activities and potentials found in Indramayu include: fish
nurseries, mangrove ecosystems, increased seafood production, farms managed for milkfish, seaweed and shrimp aquaculture, processing of marine waste, conservation and restoration of ecosystems [3].

In Indramayu, most high schools and vocational schools are located on the coast with abundant marine resources. Marine resources can be used as a learning resource that is useful for students in the future for their career journey, but contextual learning with the content of maritime content is still very rarely done. Many teachers are still having trouble finding a model for learning with maritime content. Content regarding maritime resources needs to be packaged and taught contextually and pleasantly. This marine environment is relevant when studied through ecosystem content while processing natural resources into a product is interesting if it is integrated into biotechnology learning that is closely related to science learning. Learning science is a complex matter and is highly demanded in schools with the aim of developing understanding of concepts, procedural knowledge, understanding the nature of science, uskills, and associating sociosocial issues [4].

Practical scientific investigation appears as an emphasis in the new curriculum, namely on "doing of science" activities so that students have the opportunity to have an experience a procedural activity and have the conceptual knowledge needed to conduct investigations carried out in limited classrooms and in the environment [5]. Through this investigation practice, "students can investigate a phenomenon, propose ideas, explain and justify statements based on evidence and do so with enthusiasm" [6].

Millar has defined investigation as: a practical activity in which students are not given a complete set of instructions to follow (as a work guide), but students have the freedom to choose procedures that must be followed, decide how to record, analyze and report the data collected [7] . But often students cannot develop their investigative skills properly, therefore, little meaning is obtained from these activities [8, 9]. It is necessary to develop properly so that students can be brought closer to science by helping them develop an understanding and appreciation of the nature of science [10, 11].

This investigative practicum activity is considered to be optimal if it is developed by the 3D method. Practicum Investigation that has been developed is expected to function to motivate students’ interests and desires to learn science [12], giving rise to attitudes, independence and self-motivation of students [13,14], as well as improving students' thinking and skills in learning new things [15]. In addition, the investigative practicum will make students integrated with various learning spaces including discovery of phenomena, real life problems, and various natural and social conditions that occur around it so that it can become a learning environment that has a high impact on student creativity [16].

It can also show the existence of social and cognitive processes to put "the world into words" students must be able to change perceptions, experiences, emotions, understanding and desires into a medium for expression and communication [17]. This of course is inseparable from the pattern of instilling life skill based education that will help young people to overcome difficulties in life [18]. The purpose of life skill is to equip individuals with the right knowledge about risk-taking behavior and develop skills such as communication, assertiveness, self-awareness, decision making, problem solving, critical and creative thinking to protect them from abuse and exploitation [19]. Thus, relevant life skills can help in dealing with existing problems in a way to get the desired behavior practically [18].

Based on the results of previous studies, it has been explained a lot about the relation of practical activities to one's abilities in thought and skills, but it is not yet known what components of skills are affected and what factors cause students to have creative thinking skills and life skills. Therefore, in this study the researchers wanted to develop a design of marine resource investigation practice and see its effect on the creative thinking skills and life skills of Maritime Vocational school students in the biotechnology chapter of 10th grade in the manufacture of yogurt using Gracillaria sp. in Indramayu.

2. Methods
The research method used in this study is the 3D research and development method which includes define, design, and develop [20]. Define stage: determine the object of research and identify needs based on field studies and documentation studies (students, schools, curriculum, and literature studies). The
design stage was to design the design of investigative practical activities on biotechnology material. The stages of development are carried out by validating and developing products to produce tested products. The stages of develop are interpreted in the form of limited implementation of investigative practicum design in the experimental class. The stage of developing this research is testing the effect and effectiveness of the product through the quasi experimental method.

Participants in the study were 40 students from the 10th grade of the Fisheries Product Processing Agribusiness (APHP) study program who would study biotechnology at the Mitra Maritime Vocational School. This research is focused on processing one marine resource in Indramayu by utilizing the principle of biotechnology, namely processing seaweed *Gracillaria* sp. become one of the enhancers of taste and creation in yogurt.

The instruments used in this study included investigative worksheets, investigative observation sheets, creative thinking skills instruments, and life skill instruments. For supporting data in this study additional instruments were used in the form of questionnaires and interviews to explore students’ responses regarding investigative practicum. The procedure in this study is to assess the students’ creative thinking skills and life skills that are carried out at the beginning of learning and prior to habituation in conducting investigative lab work. To find out whether or not the influence of the design of investigative practicum activities developed on creative thinking skills and life skills of Vocational students is statistically tested by performing an independent sample T-test. As for the assessment of the effectiveness of the practicum design that was developed, it was seen during carrying out the investigative practicum activities. The aspects assessed in creative thinking skills are fluency, flexibility, originality, and elaboration. Whereas for life skill, it is seen based on aspects of thinking skills (analytical skills, creative thinking, critical thinking, problem solving, and making decisions), social skills (interpersonal, communication, leadership, management, advocacy, cooperatives, and team building), personal skills (comfortable with others, managing taste, managing emotions, managing stress, resisting stress). The categorization of effectiveness from investigative practicum design development [21] is presented in table 1:

| Conversion Score | Category     |
|------------------|--------------|
| 80-100           | Very Good    |
| 60-79            | Good         |
| 40-59            | Fair         |
| 20-39            | Poor         |
| 0-19             | Very Poor    |

3. Result and Discussion
The results of this study can be seen in the figure, regarding the comparison of the average creative thinking skills of the experimental class and the control class (Figure 1), the comparison of the life skill average values of the experimental class and the control class (Figure 2), and the average test results average creative thinking skills and life skills of the experimental class and control class (Table 2).
Figure 1. Comparison of the average value of creative thinking skills indicates that the experimental class has a higher average value both at the pretest and posttest than the control class. This shows that the skills to think creatively in the experimental class is better than the control class.

Figure 2. Comparison of average values pretest-posttest in life skill test shows that the experimental class has a higher average value of life skill both at the pretest and posttest compared to the control class. This shows that life skills in the experimental class are better than the control class.

The average value of creative thinking skills and life skills of the experimental class students and the control class based on Figure 1 and Figure 2 were tested by the independent sample T-test to see the differences as shown in table 2.

| Variable          | Experiment | Control | Sig  |
|-------------------|------------|---------|------|
| Creative Thinking | 70.37      | 59.63   | 0.011|
| Life Skill        | 55.33      | 46.17   | 0.006|

The results of testing the average difference in the two variables in the Table 2. showed a significance value calculated < 0.05, this shows that both the creative thinking skills and the life skill of the experimental class differed significantly from the control class, meaning that the design of investigative practicum activities developed had an influence on students creative thinking skills and student life skills.

The results of the assessment of this study show students have the skills to think creatively when conducting investigative practical activities on biotechnology materials making yogurt using seaweed. This is supported by the results of a questionnaire of 66% (most) students do not feel difficult and able...
to make yogurt because product processing is an activity that is often carried out by students even without a theoretical concept. This is similar to the skills of students to think creatively on the flexibility indicator students feel excited about learning and feel they have gained new experiences and find many things that they do not know. This is also supported by the results of a questionnaire of 64% (mostly). As expressed by Millar and Abrahams, science and practical learning is essentially an effort to broaden students’ knowledge of nature and develop their understanding of ideas, theories, and models that are useful for explaining and predicting behavior.

Natural science learning involves the process of “showing” facts to students, or placing students in situations to observe directly [22]. Therefore, when conducting investigative practicum students are easier to think and associate the knowledge they have seen with their minds so that it makes it easier for students in making products and understanding theories about biotechnology to be more meaningful.

The results of other studies showed that the design of investigative practicum developed had an effect on students’ life skills. This can happen because if students acquire good study habits and positive attitudes towards science during school, it is relatively easy for them to obtain additional scientific knowledge in the future. In addition, cooperation between groups of cooperative students in conducting investigations makes students have better life skills, especially on social skills indicators. The learning process runs well when students besides using previous experience, there is interaction between students, and or through personal construction to internalize and expand their knowledge.

As an object that is also directly affected by investigative practicum activities developed, it is very important to see how students respond to investigative practicum activities. Positive responses of students certainly indicate that practicum activities that have been developed are enjoyed and help students learn. Through the results of oral and written interviews given to students, most students assess very well the learning that has been done. This excellent assessment illustrates that students enjoy learning activities and involve them actively in learning. This can be understood because during learning activities students seem enthusiastic in participating in learning. Although not a primary consideration in assessing the effectiveness of investigative practicum designs, this assessment in general can show that students like learning that actively engages them. The advantages of practical activities expressed by the students are that they feel that the practical activities that have been passed make them easily understand the lessons given, other students argue that this practical activity makes them feel enthusiastic and interested because they can be felt directly by themselves. If worksheet is arranged systematically, neatly, and attracts students' attention, it will arouse students' interest in learning so students easily understand the material provided [24]. Therefore the effectiveness of the investigative practicum design developed can be seen from the results of the questionnaire showing results above 60% and the average value obtained by students in the experimental class on both variables is higher than the control class.

Therefore, students in the experimental class who learned using investigative practicum design had higher creative thinking and life skills because in practicum they felt more relaxed and their activities were interesting, namely the activity of making products they had never eaten and utilizing natural resources what is in their environment is also accompanied by direct observation of the pond environment when extracting information about marine resources because they feel learning while playing in the wild, with real learning objects. Experience in practical activities is a part of hands-on that involves students in direct participation in activities such as collecting and analyzing information, describing solutions, making graphics, tables, drawings or working papers to help them think critically and communicate what they find. The experts agreed that active learning activities through practicum play an important role in increasing student understanding. Piaget argues that knowledge is not obtained passively by someone but through action [25].
4. Conclusion
There is an influence from the design of investment practicum developed to creative thinking skills and life skills of maritime vocational school students. Besides the development of investigative practicum design is effective in learning activities because activities that train students to conduct investigations in practical activities make learning more meaningful and can encourage the development of students' understanding and skills. However, there are other factors that influence students' creative thinking abilities and life skills. The implication of this research is that in the implementation of investigative labors should pay attention to students' initial abilities and should conduct preliminary activities to help students prepare themselves to receive new knowledge with the experience of previous students using natural learning objects and representative media recognized by students before continuing to core activities.

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