

# Improvement of Geography Teacher's Skill in Making Learning Media Based on Remote Sensing Image

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**Abstract**— This study aims to describe the improvement of knowledge and skills of geography teachers through training activities on processing and using remote sensing images as a source of learning geography to improve the quality of Geography learning. The target is the State and Private High School Teachers in the Tegal Regency. This location was chosen because Tegal Regency is a district far from the central government of Central Java, thus require more attention including training activities for local teachers. The tools and materials used are Landsat 8 and Quickbird Satellite Imagery. Both images have different spatial resolutions, so they can be used as learning media in accordance with the expected competency standards. The results showed that: 1) Participation, response, and activeness of participants during the lecture and practice were very good, 2) There was an increase in knowledge of digital audience sensing material of the participants based on the comparison of the results of the Pre-test and Post-test, and 3) The outcomes in the form of image maps is still less than the expected target. Therefore, the suggestion that is proposed is that there is a need for ongoing assistance and training in the creation of image-based media.

**Keywords**—geography teachers, introduction of learning media, remote sensing, quality

## I. INTRODUCTION

The Indonesian government through the Ministry of Education and Culture issued Law number 81A of 2013 which legalized the implementation of the 2013 curriculum started from the 2013/2014 school year [1]. The 2013 curriculum adheres to the basic view that knowledge cannot be transferred from teacher to student. Learners are subjects who have the ability to actively seek, process, construct, and use knowledge. For that, learning must relate to the opportunity given to students to construct knowledge in their cognitive processes. In order to truly understand and be able to apply knowledge, students need to be encouraged to work diligently to solve problems, find everything for themselves, and work hard to realize their ideas.

To fulfill the mandate of the 2013 curriculum, teachers need to improve various kinds of learning media.

During this time the use of media in geography learning at schools still relies on wall maps and other simple media, thus reducing the interest of students in the geography material. In fact, there are many different types of interesting geography learning media, including satellite imagery and aerial photography, which are available both on the internet, and government institutions such as the Jakarta National Institute of Aviation and Space (LAPAN).

Satellite Imagery and Aerial Photographs are remote sensing technology products that photograph the earth's surface with vehicles in the form of satellites and other aircraft [2]. Because it is the result of shooting, everything on the surface of the earth will be recorded, thus the level of abstraction in remote sensing images is almost non-existent. This is different from maps that have a high level of abstraction due to the generalization of objects as the influence of scale [3]. Remote sensing images provide a complete picture of the earth's surface, so this remote sensing image can help the teacher to convey geographic material in the classroom. Sutanto [4] explains some of the advantages of using remote sensing image media in Geography learning which are as a tool for finding facts, a tool for illustrating an area, and as a tool to explain regional development.

The use of remote sensing images in geography learning is not only as a learning medium, but also as a learning resource [3]. For this reason, the mastery of Geography Teachers in interpreting and making learning media based on Remote Sensing Imagery becomes very important. However, the fact in the field shows that Geography Teachers still rarely use Remote Sensing Imagery as a medium and source of geography learning. For this reason, remote sensing image processing training is needed as a geography learning media which aims to: (1) increase knowledge about the use of satellite imagery as a medium and source of learning geography, and (2) provide basic skills in processing remote sensing image data through image processing practices with ER Mapper and Arc View software.

The use of creative and informative learning media is highly recommended in geography learning. This is because geographic material is quite broad and complex, and there is a need for observations outside the classroom. However, due to time constraints, the observation of geographic phenomena outside the classroom is rarely done by teachers. The observation can actually be used to help map media and remote sensing media as well as other image media.

**II. METHODS**

The implementation of the activities was carried out in Tegal Regency, with the target of the Geography teachers of High School (SMA/ MA) who are members of the Geography Teacher Group (MGMP) of Tegal Regency. Tools and materials for image processing activities consist of: 2002 Landsat 7 ETM imagery (RAW), 2016 Landsat 8 ETM image (RAW), 2012 Quick bird imagery, and participant's Laptop Device.

The method used in the community service activities is in the form of training in making remote sensing-based geography learning media consisting of three types of activities, namely: (1) Lecture activities with remote sensing material delivery, emphasized more on the satellite system senses. This is important considering that the acquisition of Remote Sensing satellite image data is easier than aerial photography. (2) Remote Sensing Image Processing Practicum for Learning Media with ER Mapper software. (3) Discussion activities in which participants discuss the results of the Remote Sensing image as a learning medium.

The measurement of the success of the implementation of this activity was carried out in two ways, namely (1) providing a kind of Pre-Test and Post Test about the benefits of remote sensing images as a geography learning medium in high school and (2) evaluating the results of sensory image processing products from all participants.

**III. RESULT AND DISCUSSION**

*A. Characteristics of Participants*

Participants in the Community Service activities are Geography teachers who are members of the Geography MGMP group in Tegal Regency. The number of participants in the training were 19 people, with details of 18 participants from state high schools (SMA Negeri) and one participant from state islamic high school (MAN). The average age of the participants is 44 years, the oldest participant is 59 years old and the youngest participant is 29 years old. Participants' educational background are Geography Education undergraduate programs from various state and private universities. Overall the names of trainees in the framework of community service activities are presented in the table 1.

TABLE I.

No.	Characteristics	Classification	Sum
1	Age	<30	1
		30-40	4
		40-50	10
		50	4
2	Work Unit	SMA	18
		MAN	1
3	Alumni	S1 Geo Edu	17
		S1 Non Geo Edu	2

*B. The Implementation Community Service Activities*

The implementation of community service activities was carried out on May 11-12, 2017, at the Social Sciences Laboratory room of SMA 3 Tegal.

The first day of the program began at 8:00 am. It started with a report from the Chairperson of the Tegal Geography Study Unit. The next speech was from the head of the UNNES Service Team who presented the purpose and objectives of the community service activities and introduced the Team Members to Community Service Activities. Then continued with a speech from Tegal District High School Supervisor which also opened the Training on Making Geography Learning Media based on Remote Sensing Imagery as seen in the Fig. 1.



The second day of the program, started at 8.00 o'clock by continuing the first day's work and new material, namely cropping. The results of cutting the next image in the layout become an image map. This event takes up to 210 minutes (3.5 hours effective). However, many of these activities are still unfinished due to time constraints.

The next activity is doing image layout activities that have been polled according to the design of learning materials. This event takes 2 hours. Next, the next event is to present media products in the form of processed image maps by sampling to be discussed together. Among the 19 participants, we took 4 participants who have completed the activity completely. After the presentation of the next activity is a post-test evaluation, as well as feedback from participants. The last activity is closing.

The figure 2 showed the activity of image processing practices.



**C. Evaluation of Activity Implementation**

*a. Evaluation of Participant Activities*

Overall training activities for making remote sensing imagery-based geography learning media conducted at SMA Negeri 3 Tegal run smoothly and well. The number of participants who participated in the training was 19 participants or reached 100%. During the activity participants actively participate in all the events that have been arranged by the Team. The discussion during the material briefing session was quite active; there were 6 participants who asked questions and statements.

The questions asked by the participants related to how to obtain remote sensing images and how to process images so as to get a varied and interesting color composition image. Participants also asked questions related to the concept of resolution in remote sensing, and some remote sensing applications. All of these questions can be responded to and answered properly.

For statements made by participants, it is more related to the expectation that such activities can be carried out periodically so that participants can be more skilled in using image processing for learning media. Even the participants hoped to visit the Geography Laboratory of UNNES as well as the field practice model (outdoor study). This statement received a direct positive response from Team Leader who is also the Chair of the Geography Department of FIS UNNES. According to him, such cooperation can be continued without long bureaucratic procedures. Geographical MGMP Tegal can at any time come to visit the Geography Laboratory only by submitting a request letter directed to the Chairperson of the Geography Department to arrange an appointment on the schedule.

*b. Evaluation of Participant Activities*

Before conducting lectures and training activities, a pre-test is conducted to determine the extent of participants' mastery in the field of remote sensing image processing for the manufacture of image-based learning media. The pretest results showed that most participants (58percent) had a value of 50-59 or included in the Poor category, while 21% in the Moderat category, and 21% included the Good category.

Based on the results of this Pre-Test, it is necessary to conduct training activities to improve participants' insights related to remote sensing of the satellite system, as well as improve skills in the field of remote sensing image processing as a medium for geography learning.

The table 2 presents the results of the Pre-test and Post-test.

TABLE II.

No.	Test Result Score	Pre-Test	Percent	Post-Test	Percent
1	0-49	0	0	0	0
2	50-59	11	58	0	0
3	60-69	4	21	2	0
4	70-79	4	21	13	0
5	80-89	0	0	3	0
6	90-100	0	0	1	0
	Total	19	100	19	100

Source: Primary Data, 2017.

Based on the table, it can be seen that in the Pre-Test activities most of the participants had score from 50 to 58 point, 11 participants (58 percent), while the others got a score above 60 point. The average competency score was 58 point. This proves that the average knowledge of participants related to digital remote sensing understanding is still low, although this understanding is very important related to the process of making geography imagery based on remote sensing. The low level of participants' knowledge related to satellite imagery is also caused by the fact that remote sensing knowledge that has been obtained from college is only basic knowledge. In fact, there were five participants who during the time in the university did not get Remote Sensing material, because when they went to college, they still used the old curriculum.

Awareness of the need for remote sensing science to assist in the teaching of geography, caused participants pay attention seriously during the lectures on learning media material and the practice of making learning media. The difference in pre-test and post-test scores that reached 18 point was quite significant and very meaningful. This indicates that in terms of cognition, after the training, participants have experienced a significant increase in knowledge.

*c. Product Evaluation Outcome Training*

In addition to the test results, the output of this training is in the form of product, that is, remote sensing imagery. In general, it still needs to be guided further because the participants who have finished producing the map were only 4 participants, while the others are still in layout that requires completion time. However, due to time constraints, only the finished layout (four image maps) were printed (print-out). Thus, the output target in the form of a realized image map product is 20 percent.

Unlike in the realm of knowledge (cognition) which has progressed quite significantly, in the skills section it is not so encouraging that only four maps are produced. The contributing factor is the level of skill of the participants in the use of highly varied image processing software and limited time available. Besides, the age factor also seems to have a big contribution. In fact, the participants who were able to complete the tasks given at the time of the

practice of making sensory media-based media are mostly the participant with the aged under 40 years old.

#### IV. CONCLUSION

There are several conclusions that can be conveyed based on observations and evaluations of the course of community service activities, namely: (1) Participation, response, and activity of participants during the lecture and practice activities were very good. (2) There was an increase in knowledge of the digital sensing material on participants based on the comparison of the results of the Pre-test and Post-test. (3) The outcomes of the training in the form of image maps are still less than the expected target.

Based on the conclusions, we can suggest that: (1) This community service program is very useful, so it needs to be followed up in the future for the activities in other regions. (2) Because the output does not meet the target due to time constraints, in the future it will take longer time to carry out the same training.

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