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New Strategy of Communication in Disaster Education Using a Combination of SOR - ASSURE Model

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Abstract

This study aims to develop a new strategy for disaster education by combining the SOR communication model and the ASSURE learning design. This research was conducted in 3 stages, namely: (1) designing learning using the ASSURE model, (2) designing Stimulus Organism Response (SOR) in learning and (3) analyzing learning outcomes data using 9 response indicators. Research shows that educational communication in the SOR model is synchronous with the ASSURE design so that reasoning, learning motivation and direct experience in understanding disasters are more developed. The results of the evaluation of the new strategy using 9 response indicators, namely: Relevance, Consistency, Concise, Method, Analysis, Data Sources, Information, Conclusions, References show that 58% of students choose topics that are relevant to the learning material, 69% of students write short scientific papers that are appropriate. with the chosen topic, 74% of students develop experiments using statistics, and 53% of students Presenting data in visual form such as pictures and maps. This research shows that the new strategy of disaster education by combining SOR communication model and ASSURE learning design at all school levels is very effective.

Keywords: *SOR, ASSURE, communication, disaster education.*

1. Introduction

The Indonesian government policy on disaster risk reduction education has existed since 2006 with the concept of Disaster Alert School (in Bahasa Indonesia called Sekolah Siaga Bencana) , which was refined into Disaster Risk Reduction Mainstreaming in education (in Bahasa Indonesia called Pengarusutamaan Pengurangan Resiko Bencana) sector in 2010, and finally changed into Disaster Safe Education (In Bahasa Indonesia called Pendidikan Aman Bencana) in 2017 (A. Amri, 2017). In its implementation, the Ministry of Education and Culture of the Republic of Indonesia through the Bureau of Planning and Foreign Cooperation issued a comprehensive safe school framework for formal school and university education in the form of three safe school modules, namely: (1) Safe School Facilities, (2) Disaster Management in Schools and (3) Disaster Risk Reduction and Prevention Education (Nurwin et al., 2015). However, government's technical policies and strategies for disaster risk prevention and reduction have not run optimally. This can be seen in data from the National Disaster Management Agency of the Republic of Indonesia which show that, in the last 15

years, population affected by disasters has reached 28 million people and data from the Ministry of Education and Culture of the Republic of Indonesia in 2017 which show that the number of damaged schools is 266,559 schools and 1,701,302 classrooms as a result of natural disasters (M. R. Amri et al., 2016).

Education and community empowerment in a sustainable manner are important components in the context of disaster risk reduction as an effort to raise awareness of disaster risk and disaster vulnerability (Asharose et al., 2015). Literature studies show that countries in disaster-prone areas have optimally implemented a disaster prevention curriculum. For example, Japan has developed a disaster prevention education model as an important component in the national curriculum, especially in Social and Geography subjects (Koji & Hiroshi, 2013). Another example, Philippines has developed a subject in the curriculum for secondary schools with the name of Disaster Preparedness and Risk Reduction which is taught using a metacognitive learning approach (Abelita & Clores, 2018). Several countries such as Botswana and Ghana have integrated disaster risk reduction learning into basic education curricula which includes effective curricula, models, strategies and activities used for learning(Mutasa & Africa, 2018)(Apronti et al., 2015). Disaster communication education is an important factor in disaster risk reduction. Disaster risk communication (DRC) shapes one's perceptions of risk and influences one's actions as demonstrated by disaster preparedness and response. This also affects decisions in the disaster response management. Accurate and reliable information about a disaster is carried out before the disaster strikes.

Disaster preparedness is often considered as the government's responsibility which government usually provides directions regarding travel warnings whose information is distributed to all elements of the community. The nature of the communication is top-down. Local people generally do not have skills to assess risks due to limited knowledge, information and tools, and as a result, they need skills from experts. The problem with the top-down approach is that policies may be imposed on communities without taking local condition onto account, and communities may become overly dependent on information coming from government. Recent experiences from the Great East Japan Earthquake (GEJE) showed that when the local community was involved in planning for disaster preparedness, and people took ownership of their own safety plans, they were better prepared and better able to take necessary action to protect themselves" (Shaw et al., 2015). Risk communication will be successful when there is a holistic, facilitated and credible learning about disasters. Communication problems can be seen from the knowledge and understanding gap between the sender of the message (communicator) and the receiver of the message (receiver). Therefore, communication is important which it can be in form of disaster booklet, advertisement and educational institution. The role of instructors is important in disseminating knowledge about disasters. Disaster education communication efforts will minimize the risk of disasters.

SOR plays an important role in the communication. Besides teaching, communication activities of an instructor are indispensable, which in those activities, there is a process of knowledge transfer from the instructor who acts as a communicator to the communicant (students). Thus, in order for the transfer of knowledge to be understood by students, a communicator needs good communication skills. Good communication skills are shown by the instructor's ability to stimulate students with creative learning methods. This is also in line with Suparno's (1999) thinking that the proficiency of

an instructor in verbal and instructional communications determines the success of a student in the learning. Through a proper teaching stimulus, an instructor will be able to transmit knowledge smoothly.The ASSURE model will be a systematic guideline in designing teaching materials by combining various media, so that the learning process can be carried out in various contexts (Sarfo & Elen, 2014). Combination of the ASSURE learning model and PBL learning method can improve students' competence in cognitive, psychomotor, affective and knowledge exploration aspects (Ariefiani et al., 2017). ASSURE is an instructional model that can generate learning motivation and provide direct experience in understanding disaster risks of a region by using learning media according to students' needs in an integrated, systematic and effective manner such as remote sensing technology (Adedayo & Francisca, 2018)(Sezer et al., 2013). Literature studies show that the implementation of the ASSURE model in PBL learning using ICT tools is better than conventional methods (Kristianti et al., 2017)(Ariefiani et al., 2016).

2.Significance Of The Study

2.1. SOR Model

SOR is one solution to improve communication creativity and understanding of various aspects that affect communication. One of the well-known communication models is the Stimulus Organism Response (SOR) Model. The SOR communication model was originally conceived by Hovland in 1953 which originally came from psychology, which also strengthened the study of communication science. In order for educational communication to be carried out effectively, it is necessary to emphasize the variables that influence it. Educational communication is not only seen from students but also from various elements of education where learning requires stimulus from the teacher, the existence of organisms (students) and responses related to attitudes that arise from existing stimuli. Stimulus-response theory looks at the stimulus process rather than the response shown by the attitude. Thus, this theory shows how to communicate to change the attitude of organisms. In the process of attitude change, an attitude can be changed only if a stimulus actually affects the original attitude. There are three important variables in understanding new attitudes, namely attention, understanding, and acceptance (Effendy, 2003). Based on this theory, seeing the message as a delivered stimulus can increase the passion and motivation of an organism/communicant. The right stimulus will make it easier for an organism to receive the message it receives and change its attitude and behavior.

Figure 1: SOR Framework, Effendy (2003: 253)

2.2. ASSURE Model

Bauchi Nigeria developed an educational system oriented towards visual instructional learning through the use of ICT media, especially animation and multimedia. The use of animation and multimedia in learning was carried out through careful planning and implementation in the teaching

and learning processes effectively using ASSURE model (Kwasu, 2015). The ASSURE model is built with a constructivist approach so that students can communicate and interact with each other in the classroom taking into account their learning styles, potential and motivation in building information and knowledge based on previously received knowledge in Indonesia, ASSURE is used to design learning procedures using Computer Assisted Learning (CAL) to mitigate drought disasters using remote sensing media. This learning medium is built in the form of a geographic information system application and remote sensing data used for learning disaster mitigation in Climate Field School activities, for disasters caused by climate such as drought (Paseleng et al., 2018). Disaster map data meets the criteria as a learning medium because: (1) it is easily accessible to students, (2) the development and implementation of the teaching materials are easy to do, and (3) the suitability of teaching materials and instructions given by instructors(Baharuddin, & Dauly, 2017). Learning with remote sensing data media must meet the pedagogic principles of developing CAL, namely: (1) presenting knowledge in small units, (2) presenting knowledge from easy to difficult one, (3) presenting questions and exercises for students, (4) instructor can respond quickly to students' answers, (5) simulations and experiments are made with real data, (6) monitoring the success of the learning (Höhle, 2015). The ASSURE model includes the following stages:

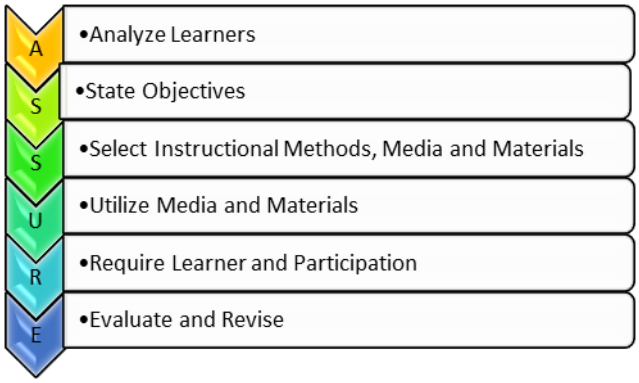

Figure 2: ASSURE model for instructional design (Othman et al., 2014)

The ASSURE model consists of the following activities (Baharuddin, & Dauly, 2017)

1. Analyzing Learners, namely analyzing the needs of instructional participants with the following criteria: number of credits that have been achieved, academic level, age, ethnicity, gender, emotion, physical, social structure, economic problems, competence before learning and ability to communicate.
2. Standard & Objective, namely the learning outcomes that will be fulfilled from the learning processes. Learning outcomes include cognitive and effective and psychomotor aspects.
3. Selecting Strategies, Technologies, Media & Materials, namely the selection and determination of media and technologies used for the learning process.
4. Utilizing Technology, Media & Materials, namely the use of media and technologies used for the learning process.
5. Requiring Learners and Participation, which is the provision of a discussion space between the instructional facilitator and the instructional participants.
6. Evaluating & Revising, namely the assessment of the results of the learning process using certain instruments.

3. Review Of Related Studies

Methodology

The research was conducted by involving 40 students who took a class on geographic information systems. Research method is qualitative. The age of students varies between 18-23 years with good learning competencies, both knowledge and special skills. Learning is carried out using a hybrid model, a combination of theory learning is 40% and practice is 60%. Learning is carried out using a computer, using Quantum GIS software and the data used is sourced from www.earthexplorer.usgs.gov. The research procedure specified in the combination of SOR and ASSURE models as shown in Figure 3.

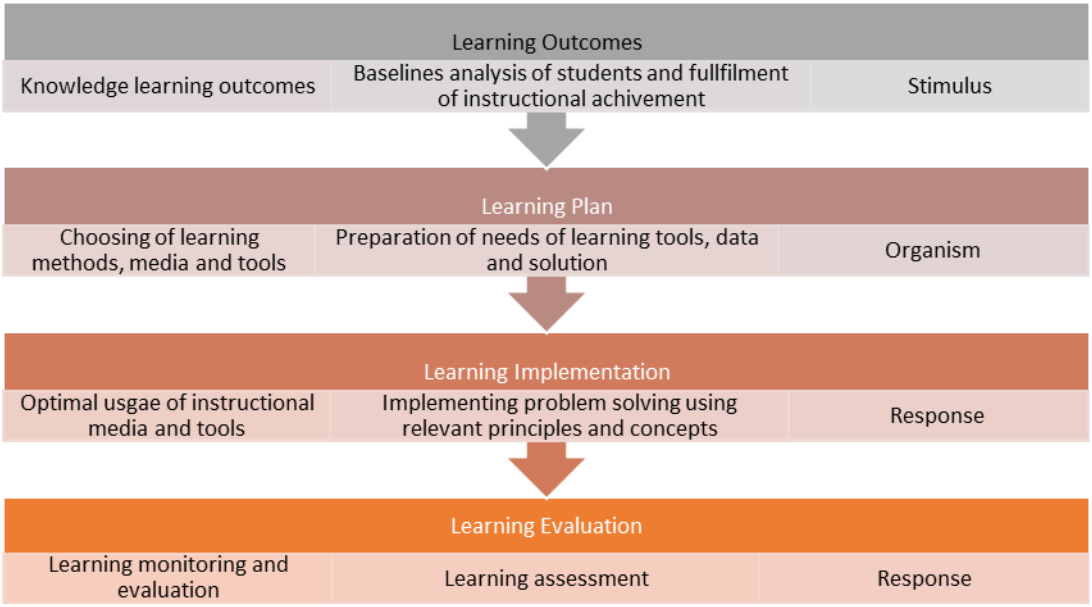

Figure 3: Research procedure specified in the combination of SOR and ASSURE models

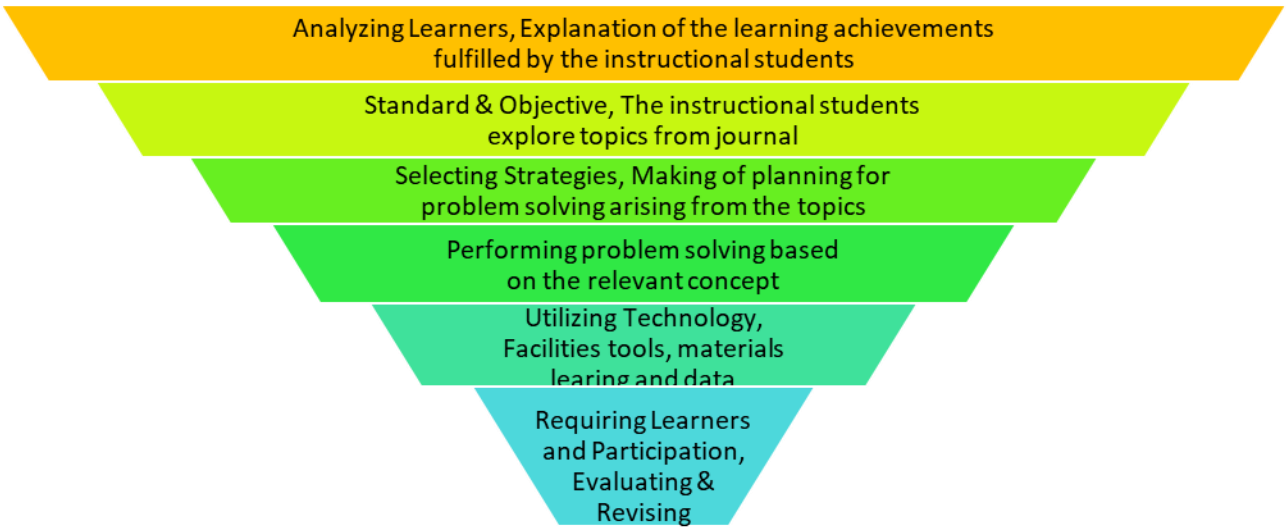

Figure 2: Research procedure ASSURE models

1. **Analyze**, The purpose of this stage is to analyze the learning needs based on the minimum criteria needed to be able to follow the learning process properly, which consists of: basic competencies of knowledge, skills, visual learning styles and kinesthetic. Learners who take this course are learners in the university students. There are 40 learners aged between 20-25 years, and they have the ability to use tools well. All learners have basic knowledge on thspatial e modeling in general, which has been taught during 7 meetings with the duration of 120 minutes/ meeting. All learners have never studied spatial data processing before and have just pludged into the knowledge when the learning is being carried carried out. The basic competencies of knowledge needed in learning this module are statistical analysis knowledge, vector data processing, and raster data classification. This competency has been given to learners during the same semester. The skills that become the criteria for learning this module are the skills to use computers and Quantum GIS tools with additional plugins and the skills to use R tools with various geospatial analysis packages. This competency has been taught for 6 meetings with the duration of 100 minutes per meeting. Visual learning style, is learners who receive information visually in form of colors in pictures. Kinesthetic learning styles, kinesthetic learners learn by experiencing, or handling things by skills using an instrument or tool. Learning this module requires remote sensing image analysis skills using Quantum GIS software with the addition of Semi-Automatic Classification Plugin, Statistics Raster Polygon and Spatial Autocorrelation functions. Learners independently use tools, handle explored data, interpret their findings and discuss the results to other learners or their instructors. The findings show that learners have a positive attitude and appreciate the learning that is carried out. The findings show that the learning module supports the learning method applied. The findings also show that effective teaching methods motivate learners to achieve the Learning Outcomes formulated in the Semester Learning Plan.
2. **State Objective**, Learning outcomes in this module are informed before the learning process begins. Learners understand and are able to explain the stages and learning process that will be carried out including the initial processing, analysis and interpretation of vector and raster data, the use of functions available in tools, and writing scientific papers with a focus on identifying disaster areas. Learners understand, able to explain and do the initial processing of satellite imagery which includes: atmospheric, geometric and radiometric corrections using tools. Learners understand, able to explain and perform satellite image analysis techniques including supervised classification, unsupervised classification, vegetation index calculation, interpolation, and the use of digital elevation models in accordance with the research objectives, such as identification of disaster areas. Learners understand, able to explain and identify disaster risk areas based on color indicators, polygon shapes, and index values, Learners are able to identify disaster risk areas by using remote sensing imagery data as a data source supported by other data. Learners are able to analyze remote sensing image data, visualize disaster areas in form of thematic maps that are easily understood by users. Learners are able to write the information descriptively in form of scientific work and publish it in a journal. The cognitive aspect designed in this module is to take Bruner's cognitive learning theory with the concept of discovery learning. The concept of discovery learning is learning that demands inventions throughout the learning process. Teachers create a learning atmosphere by providing problems and learners are required to find solutions through an experimental process independently in the classroom(Sundayana et al., 2017).

The aim to be achieved is that learners get findings in accordance with their respective experiments and are easy to remember because they are more specific. The implementation of discovery learning concepts in this module is as follows: (1) Learners get a task on extracting features and analyzing to get specific objects ; (2) By using methods and indicators that have been determined, learners are assigned to identify spatial objects that have a correlation with disaster events. Affective aspects that are designed in this module are on the dimensions of knowledge, skills and attitudes of the learners. Dimension of knowledge, requires learners to have the ability aat developing ideas based on concepts and rules that exist in the science of spatial modeling. Dimensions of skills, requires learners to have the ability to implement ideas in form of useful information for users. The concept and idea of identifying disaster areas obtained from remote sensing image data is realized in form of information such as thematic maps or other infographics that can be understood by users. Dimension of attitude, requires learners to have the ability to provide positive responses, appreciate and result in action. Disaster risk information that has been manifested in form of thematic maps or other infographics is disseminated to users in various media such as learning modules and scientific works.

3. **Select Instructional methods, media and materials.** Determining educational technology, media and learning materials to be used based on learning outcomes. Learning the theory of remote sensing and disaster mitigation is done by presentations using Microsoft Power Point applications. Practical learning is carried out using textbooks that are compiled to complement this learning module. Learning by practice of initial processing and further processing of remote sensing image data is done using a set of computers connected to the internet and there is a Quantum GIS software application. The data used in learning media are Landsat 8 OLI satellite images from band 1 to band 11 in GeoTiff format, map data with shapes files format (ESRI), attribute data files according to learning topics in formal CSV such as vegetation index data and daily rainfall data. Statistical calculations using R software. Testing accuracy and validation of remote sensing image interpretation is done in the field using the Matrix Confusion method and the Garmin Type 78S Global Positioning System device. The results of learning theory and practice are written in form of scientific papers using Microsoft Word software and compiling library references using Mendeley software.
4. **Utilize Media, Materials, and Methods.** The learning time of each meeting is 120 minutes divided into two parts, such as theory and practices of spatial data processing. Theory learning is carried out with a duration of 30 minutes through presentation activities using computer media and Microsoft Power Point software. Learning practice of spatial data processing is carried out for 90 minutes using computer media and Quantum GIS and R software. Learning practice of spatial data processing is done by the demonstration method and participants follow each of the stages together – using data that has been prepared by each learner. After completing the practice, each learner is asked to tell the stages of activities that have been carried out, the objectives and the results obtained. Facilitation of learning needs for learners is met through several activities. First learning is done in form of 30% lecturing/ tutorials and 70% practice and independent learning. Practical learning in the computer lab is done by experiment using real data and giving examples of outcomes that must be achieved at the end of learning. In each meeting, learners are given the opportunity to present the results of his/her learning outcomes.

5. **Evaluate & Revise, Evaluation of learning activities is carried out in two forms, such as rubric assessment and scientific paper.** The evaluation is based on each achievement of the in Figure 1 which is assessed using a rubric assessment. If learners have not yet reached the standard for each stage, they are required to revise the achievement of the learning stage. Teachers set competency standards at each face-to-face meeting formulated in the Semester Learning Plan document. The evaluation of the achievement of competency standards is carried out using rubric assessment documents. Learners who have not yet reached the competency standard are given only one opportunity to improve their work and get remedial on the rubric assessment. Learners are declared as competent and successful in learning if they have produced scientific work, which have been reviewed by teachers and recommended for publication in national journals. The evaluation of the scientific work is carried out using the assessment are 9 indicators. (1) Relevance, topics and contents of the scientific papers have strong relevance to the subjects taught. (2) Consistency, title, abstraction, keywords, introduction, methods, results, discussion and conclusions are related and consistently reflect the purpose of the scientific work. (3) Concise, the scientific work is written concisely, easy to learn and interesting to read. (4) Methods, the research method used is in accordance with the objectives of the scientific work, and can be repeated by other researchers. (5) Analysis, the data processing in the scientific works there is data analysis using a statistical approach in accordance with the direction and objectives of the study. (6) Data sources, the data sources on the scientific work are explained in detail, in form of tables, or figures. (7) Information, the information that is displayed in form of figures and tables is presented in full and in detail, complete with labels. (8) Conclusions, the conclusion in the scientific work present data on the results of experiments/research. (9) References, the references used are key references of scientific work. Each indicator is rated between the lowest value of 1 to the highest value of 10.

Findings

The media used by the communicator must be adapted to the character of the communicants. In this study, the instructor uses various types of media such as Power Point, sensing application and attractive pictures to make it easier for students to understand the objectives of the learning. Characteristics of Communicants (Organism), whether or not a message or communication stimulus can be received by communicants depends on the characteristics of the communicants. From the start, the instructor understood the situation of communication in the classroom and knew well the background of the students to determine the right approach. If the instructor can take the right communication approach, the instructor as a communicator will be able to create a persuasive communication to students. Adler and Rodman (2006: 426) have formulated the concept of persuasive as “the process of motivating someone through a communication to change certain beliefs, attitudes or behaviours.” This relates to the dimension of relationship in communication between the instructor and his/her students. Each indicator is assessed from the lowest score of 1 to the highest score of 10. The results of the assessment are presented in Figure 4.

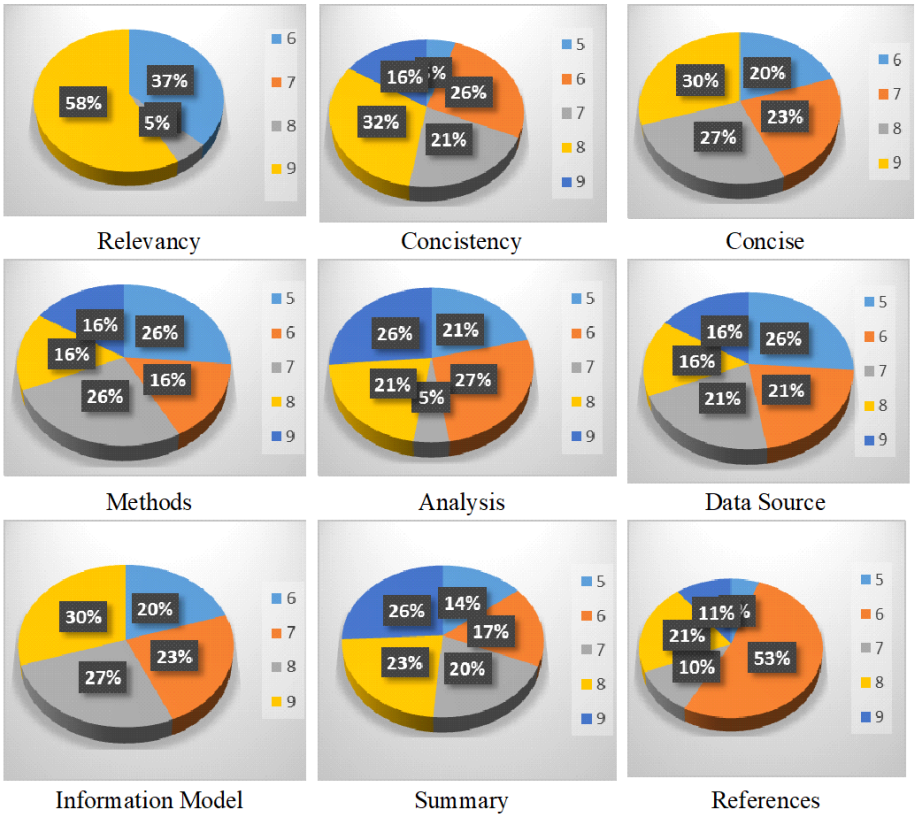

Figure 4 : Assessment of learning activities of students' final project with the topic of natural disasters

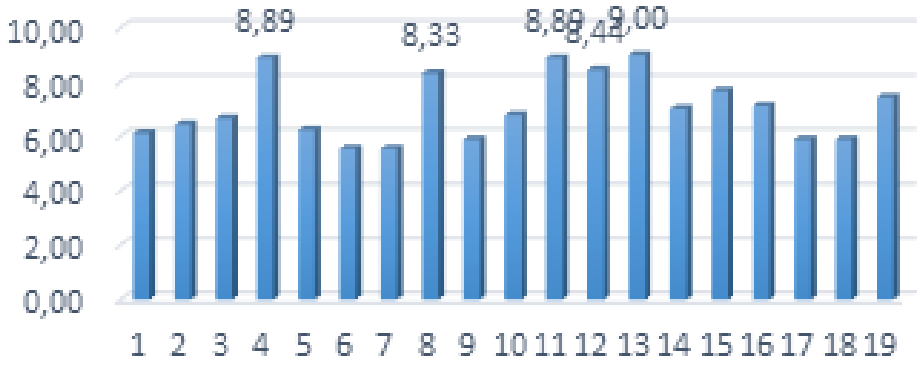

Figure 5 : The Average Scores of Relevancy, Consistency, Conciseness, Methods, Analysis, Data Sources, Information Models, Summaries, and References indicators in Scientific Papers.

Discusion

SOR elements, the following are elements in the research context. Stimulus (S) is idea of a combination of Assure and PBL models is to increase students' interest in scientific papers for

analysis and interpretation of spatial data analysis for identification of natural disaster areas. Organism (O) are student as respondence research. Response (R) is in the form of an effect that is expected to occur, which students will be able to make scientific papers on topics relevant to the lecture. Referring to the SOR communication model. Attention, There are 58% students who produced scientific papers thematically with topics that had a strong relevance to the learning material, namely the analysis and interpretation of information on natural disasters. In order to produce scientific works, students carried out experiments in accordance with a procedure of identification and modelling using relevant data. 37% of students produced scientific papers on topics that were less relevant to the final work. In order to produce their scientific works, students classified data using trend patterns of data as a reference. Thus, the existence of topic suitability for the majority of students indicates that there was a strong attention from the students to the topic given by the instructor.

Definition, there are 69% students who were consistent on the topic selected and described from the beginning of the writing to the end of the writing. This study shows that after attending the lecture, 80% of students had the ability to write concise and interesting scientific papers. This ability was obtained from the learning process carried out both theoretically and practically. Students were able to design, implement and compile research reports according to research methodologies (74%). Students were able to choose and apply statistical methods in accordance with the objectives of their research and interpret them according to their goals (53%). Students also had a consistent ability to write scientific papers in accordance with the expectations of the instructor. Consistency aims to see the suitability of the analysis and interpretation of information on natural disasters as reflected in the title, abstraction, keywords, introduction, methods, results, discussion and conclusions. Thus, the stimulus provided by the instructor can be said to be successful in providing understanding of students' cognition. Reception, There are 53% students who understood the importance of presenting data in various forms such as tables, images or textual according to the research objectives. More than 60% of students presented complete information on the results of their research at the conclusion and included key references that have strong relevance to their research results.

The results show that there were 5 (five) scientific papers that scored > 8.00 on the evaluation of learning outcomes with indicators of Relevancy, Consistency, Conciseness, Methods, Analysis, Data Sources, Information Models, Conclusions, and References. This score indicates that students were able to practice identification and modelling techniques or procedures using relevant data. Students were able to develop their ideas to apply other computational methods beyond the materials taught in the learning. This shows a good acceptance of the stimulus that had been given by the instructor. Individual Learning Process. In the S-O-R theory, attitude change is a part of the learning processes. The messages (stimulus) given by the instructor (communicator) to the students (communicant) can be understood by the student. If students do not respond well, the provided stimulus through the learning process in the classroom is considered as less effective.

The purpose of the learning of disaster risk reduction using remote sensing is limited only to the extent of students' interest in writing scientific papers. After participating in the lectures for 4 months, it was found that 58% of students were able to make scientific concepts that were relevant to

the topic, namely the analysis and interpretation of remote sensing images to identify areas with risk of natural disasters. Through the support of the instructor's expertise in combining the two learning models, students (communicants) can respond the learning which is shown in the changes of their attitudes. Based on the research results, the stimulus provided by the instructor through a combination of Assure learning model and project-based learning model is considered as effective and it can be continued to be developed later. This is indicated by the ability obtained from the learning processes that were carried out theoretically and practically. Factors Affecting the Success of the Stimulus. This is the learning outcomes that have been achieved, there are important factors that influence. Communicator, Communicator is the messenger, which is related to the source of stimulus. Communicator must have credibility in the eyes of the communicant. In this study, the communicator is the instructor and communicants are students. The credibility and ability of the instructor in the management of communication in the classroom organization also influences students' attention. Media, in the communication process, media acts as a tool or means used by communicator to convey messages to communicants. Instructor carefully selects media so that messages or stimuli can be accepted easily by students.

7.Recommendations

- The combination of ASSURE and SOR Model of communication has proven to be effective increasing attention and acceptance of learning. It can be tested on other classes or research.
- For further research can develop methods by quantitative techniques to measured the level of learning achievement, the level of perception and level of student interest.
- The competence of the communicator (lecturer) providing stimulus in learning process is proven increase student interest in the topic. For further research, communication strategies by communicator can be research variable.

8.Conclusion

The results showed the combination of SOR and ASSURE helped learners develop reasoning, learning motivation, and direct experience in understanding disaster risk in their areas by using remote sensing media. As many as 69% of learners' scientific papers were written in a concise manner which is consistent with the topic chosen, including the introduction, contents and the closing of the scientific papers. 74% of learners were able to design, carry out and report their experiments according to the chosen topic and use various statistical methods to compile spatial models. As many as 53% of learners were able to present data used in their research using tables, graphs and images (including maps). There are 60% of learners concluded that their research findings are in accordance with the solution to the problem formulated and write key references according to the topic.

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