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Training of Natural Science Learning based Ethno-STEM for Teacher of Muhammadiyah Secondary School in Sidoarjo

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Abstract

Local wisdom that was raised as a model to understand the concept of natural science has been done in various regions and improved good results. In the current condition of the covid-19 pandemic, natural science teachers need effective learning strategies in conveying concepts, through natural science learning based ethno-STEM this can be answered. The community servicer was gathered natural science teachers of SMP Muhammadiyah throughout Sidoarjo regency to develop natural science learning based ethno-STEM what material and instruments through training. This activity was attended by 21 natural science teachers, representing of ten SMP Muhammadiyah throughout Sidoarjo regency. The activity lasted for 4 days from December 30, 2020 to January 2, 2021, which produced natural science learning based ethno-STEM what material and instruments for secondary school grade VII, VIII, and IX even semester. These learning material and instruments have also been studied by experts so that the results of improvements will improve the validity of the devices and instruments in question. The resulting devices and instruments will be compiled and made into practical books teaching natural science based ethno-STEM. This book is then registered in the Library of The Republic of Indonesia and registered in the Intellectual Property Rights. Advice for further community service activities so that devices and instruments can be implemented in students so that their practicality and effectiveness are tested.

Key words: ethno-STEM, natural science learning, secondary school

INTRODUCTION

Local wisdom is closely related to the traditional culture of a local area [1]. This local traditional culture should continue to be maintained and preserved until future generations [2]. This local wisdom is a wealth of local culture that also enriches national culture [3]. Many advantages are obtained in preserving local culture, in addition to being able to attract tourists are also able to become regional income.

Local wisdom is an element of the cultural traditions of a nation's society, which appears to be the parts placed in the physical order of buildings (architecture) and areas (urban) in the geographicality of a nation's nusal [4]. The characteristics of plurality of a community or region (geographical) such as Indonesia in the form of islands must be accepted as an objective reality that contains potential conflict [5]. So, local wisdom becomes the identity of a community or region that is civilized and needs to be preserved, one of which is through learning activities in schools.

Natural Sciences or known as science is one of the compulsory subjects in secondary school. Achmadi and Sudibyo [6] state that natural science or known as science is a theoretical knowledge obtained or compiled in a special way, namely making observations, experiments, conclusions, theoretical preparation, observations, and so on. Natural science as a science that is not only knowledge [7] of facts, concepts, principles, laws but also there is a process of how to find knowledge through observation and experiments that are systematically verified.

The results of the Muhammadiyah Central Leader Decision, that learning in the school year 2020/2021 will be implemented remotely. This is because the Covid-19 pandemic period is not over, and prevents transmission by limiting physical and social distance [8]. Distance learning can be divided into 2, namely online learning and learning outside the network (offline) [9]. With the ethno-science approach is expected to build natural science concepts in schools, especially in junior high school.

Efendi, et al [10] research results, that online learning conducted by natural science teachers in East Java shows less prepared in terms of infrastructure facilities and other supporters, and teachers and students still cannot understand online learning because they still like face-to-face learning. In the research it is advisable to find the appropriate learning strategy that can be used both online and offline.

By paying attention to the analysis of the situation, it is important to assist natural science teachers in utilizing local wisdom by creating natural science based ethno-STEM learning devices for Sidoarjo Regency.

METHOD

This community service is aimed at providing training to Muhammadiyah Secondary School teachers in Sidoarjo in developing natural science based ethno-STEM learning devices. Muhammadiyah Secondary School Teacher in Sidoarjo numbered 21 people, spread across 10 schools, namely SMP Muhammadiyah 1 Sidoarjo, SMP Muhammadiyah 2 Taman, SMP Muhammadiyah 3 Waru, SMP Muhammadiyah 4 Porong, SMP Muhammadiyah 5 Tulangan, SMP Muhammadiyah 6 Krian, SMP Muhammadiyah 8 Tanggulangin, SMP Muhammadiyah 9 Boarding School Tanggulangin, SMP Muhammadiyah 10 Sidoarjo, and MTs Muhammadiyah 1 Taman. Natural science based Ethno-STEM learning devices developed include syllabus, Implementation Lesson Plan, Teaching Materials (materials and LKS that follow the syntax of project-based learning models), and a grid of problems both affective, cognitive, and psychomotor. The activities were held in parallel from December 30, 2020 to January 2, 2021, which included material delivery activities and practical examples, the development of natural science based ethno-STEM learning devices and instruments, mentoring/ feedback and follow-up, and the finalization of learning devices and instruments. The results were obtained by natural science based ethno-STEM learning devices and instruments for Secondary School VII, VIII, and IX even semesters. Community service activities are carried out in 3 stages, namely:

1. Planning Stage

This stage starts from the results of interviews with principals and natural science teachers about natural science learning that took place in the classroom during the covid-19 pandemic, teachers find it difficult to teach natural science with the learning media that has been used. With this in mind came a plan to conduct training for natural science teachers at Muhammadiyah Secondary School in Sidoarjo about natural science based ethno-STEM learning. The servicer maps the basic competencies of the natural into ethno-STEM, compiles ethno-STEM guidance modules, and compiles hand out powerpoints for training activities. This is done to make it easier for teachers to understand ethno-STEM.

2. Implementation Stage

This stage starts from the training of the development of natural science learning devices based on ethno-STEM Sidoarjo Regency. At this stage, the servicer assists the teacher in developing natural science based ethno-STEM learning devices and instruments.

3. Reporting Stage

This stage begins with a compilation of devices and instruments that have been compiled by teachers which are then examined by experts and revised according to inputs, so that valid learning devices and instruments are obtained.

RESULTS

The results of community service activities are as follows:

1. Mapping Basic Competency of Natural Science into ethno-STEM

Table 1. Mapping Basic Competencies of Secondary School Class VII in Even Semester

Basic Competency		Local Wisdom (ethno)	STEM Analysis
3.6	Identifying systems of organization of life ranging from the cellular level to the organism and the main composition of cell sanctification.	Identify organizational systems through the life cycle of kupang (typical Sidoarjo animal), bandeng, or shrimp.	**Science:** 1. Factual: Observing the life cycle of typical Sidoarjo animal (kupang, bandeng, and shrimp). 2. Conceptual: Identifies the organization of life starting from the cellular level of the organism. 3. Procedural: Steps to identify the organization's system of life. **Technology**: Train modern fish farming technology. **Engineering**: Making a model of the cell structure of plants/ animals. **Mathematic**: Calculating the length of the life cycle of the typical Sidoarjo animal.
4.6	Create a model of plant/animal cell structure.		
3.7	Analyze interactions between living things and their environments and population dynamics due to those interactions.	Analyze the interaction between living things and the environment and their populations through the ecosystems of ponds, ponds, seas, rivers in Sidoarjo.	**Science**: 1. Factual: Observing the ecosystems of ponds, ponds, seas, rivers, and rice fields in Sidoarjo. 2. Conceptual: Classifying the types of living things in different ecosystems. 3. Procedural: Steps in observing populations in ecosystems. **Technology**: Introducing ecosystem observation technology. **Engineering**: Making a mockup of the observed ecosystem. **Mathematic**: Calculating the population of each ecosystem.
4.7	Presents the results of observations of the interaction of living things with the surrounding environment.		
3.8	Lysing the occurrence of environmental pollution and its impact on ecosystems.	Observing river pollution in industrial areas/ factories; pollution around the pond, river pollution due to the overflow of hot mud Lapindo Sidoarjo.	**Science**: 1. Factual: Observing the phenomenon of rivers in industrial areas and pond environments due to the overflow of lapindo mud. 2. Conceptual: Analyzes problems in the concept of environmental pollutionof natural science material. 3. Procedural: Procedure testing for pollution of river water and ponds.

Basic Competency		Local Wisdom (ethno)	STEM Analysis
4.8	Make writing about the idea of solving pollution problems in the environment based on observations.		**Technology**: The technology trained to students is the use of Scratch applications with animations about environmental pollution. **Engineering**: Students make motion graphics according to the material i.e. environmental pollution **Mathematic**: Invite students to calculate the percentage of waste that exists as a literature search process.
3.9	Analyze climate change and its impact on ecosystems.	Analyze climate change in pond and industrial areas in Sidoarjo.	**Science**: 1. Factual: Observing climate differences in pond and industrial areas. 2. Conceptual: Understanding climate and change and its impact on ecosystems. 3. Procedural: Steps in identifying the climate. **Technology**: Introducing climate monitoring technology at BMKG. **Engineering**: Create a simple climate/weather marker tool. **Mathematic**: Calculates the average wind speed that exists in pond and industrial areas.
4.9	Write about the idea of adaptation / tackling the problem of climate change.		
3.10	Describe earth layers, earthquake volcanoes, and risk reduction measures before, at the time, and after disasters according to the threat of disaster in the area.	Describing the mud layer as part of the Earth's layer, the interrelationship of mud overflow with tectonic and volcanic earthquakes in the Sidoarjo region.	**Science**: 1. Factual: Observing lapindo mud. 2. Conceptual: Understanding the concept of earth layers and disaster threats. 3. Procedural: Steps to draw layers of earth. **Technology**: Introducing seismographs, as an earthquake detection tool. **Engineering**: Make a mud mockup of lapindo. **Mathematic**: Calculates the discharge of mud bursts through Sidoarjo's BNBP data.
4.10	Communicate efforts to reduce the risk and impact of natural disasters and self-rescue measures in the event of a		

Basic Competency		Local Wisdom (ethno)	STEM Analysis
	disaster in accordance with the type of disaster threat in the area.		
3.11	Analyze the solar system, the rotation and revolution of the Earth and moon, as well as their impact on life on earth.	Analyze the constellations, moon, sun (appearance of the solar system) in the pond and industrial areas in Sidoarjo and their impact on life.	**Science**: 1. Factual: Observing the constellations, moon, and sun in pond and industrial areas or other areas in Sidoarjo. 2. Conceptual: Understanding the concepts of the solar system, the rotation and revolution of the Earth and moon and their impact on life. 3. Procedural: The steps of observing the constellations, moon, and sun in different regions. **Technology**: Introducing binocular technology to observe the solar system. **Engineering**: Create a simple solar system model/ simple binoculars. **Mathematic**: Counts the number of stars for each constellation.
4.11	Presents work on the impact of rotation and revolution of the earth and moon on life on earth, based on observations or searches of various sources of information.		

Table 2. Mapping Basic Competencies of Secondary School Class VIII in Even Semester

Basic Competency		Local Wisdom (Ethno)	STEM Analysis
3.8	Describes the pressure of substances and their application in everyday life, including blood pressure, osmosis, and capillary transport tissues in plants.	Explaining the pressure of substances through the manufacture of bag slings in the tanggulangin bag industrial area, the relation to the pressure: the smaller the cross-section, the greater the pressure exerted in UKM Tanggulangin Sidoarjo.	Science: 1. Factual: Observing the model of the bag sling. 2. Conceptual: Understanding the concept of substance stress in everyday life. 3. Procedural: Steps in observing the capillary of transport tissues in plants. **Technology**: Introduces pressure technology through infusion. **Engineering**: Make a comfortable and safe bag strap model. **Mathematic**: Calculates the pressure of a liquid at a certain depth.
4.8	Presents experimental data to investigate the		

Basic Competency		Local Wisdom (Ethno)	STEM Analysis
	pressure of liquids at certain depths, buoyancy forces, and capillaries, for example in plant stems.		
3.9	Analyze the respiratory system in humans and understand disorders of the respiratory system as well as efforts to maintain the health of the respiratory system.	Analyze the respiratory system through differences in breathing of people working in ponds, industries, and farms in the Sidoarjo region.	**Science**: 1. Factual: Observing people who are breathing. 2. Conceptual: Understand the concepts of the respiratory system, disorders, and efforts to maintain the health of the respiratory system. 3. Procedural: Steps in breathing. **Technology**: Introducing air pump/ventilator technology. **Engineering**: Create a simple breathing system model. **Mathematic**: Calculates the pulse per minute for people who are in pond, industrial, and agricultural areas.
4.9	Presents work on efforts to maintain the health of the respiratory system.		
3.10	Analyze the excretory system in humans and understand the disruption of the excretory system and efforts to maintain the health of the excretory system.	Analyze the excretion system through the behavior of people working in ponds, industries, and agriculture in the Sidoarjo region.	**Science**: 1. Factual: Observing the excretion behavior of people in ponds, industries, and agriculture. 2. Conceptual: Understanding the excretory system, its disorders, and efforts to maintain the health of the excretory system. 3. Procedural: Steps to draw an excretory system in humans. **Technology**: Introducing waste disposal technology (analogy). **Engineering**: Create a simple excretion system model. **Mathematic**: Calculating normal excretion in humans.
4.10	Make work about the system of excretion in humans and its application in maintaining self-health.		
3.11	Analyze the concepts of vibrations, waves, and sounds in everyday life including human auditory systems and sonar systems in animals.	Analyze the concept of vibration through vibrations and sounds around railway tracks, in industrial areas, and observe the waves of	**Science**: 1. Factual: Observe the vibrations and sounds of trains going over the tracks. 2. Conceptual: Understanding the concepts of vibration, waves, and sounds and the auditory system in humans. 3. Procedural: Sound steps are heard in the human ear.

Basic Competency		Local Wisdom (Ethno)	STEM Analysis
4.11	Analyze the concepts of vibrations, waves, and sounds in everyday life including human auditory systems and sonar systems in animals.	seawater in the Sidoarjo region.	**Technology**: Introducing sonar system technology. **Engineering**: Create a model of a railway doorstop that will be closed if the distance is so far from the train and post. **Mathematic**: Calculates the number of vibrations that occur in the experiment.
3.12	Analyze the properties of light, the formation of shadows on flat and curved fields, and their application to explain the processes of human vision, insect eyes, and the working principles of optical devices.	Analyze the properties of light and shadow formation in pond, industrial and agricultural areas in the Sidoarjo region.	**Science**: 1. Factual: Observing light and shadow formation in pond, industrial, and agricultural areas. 2. Conceptual: Understanding the concepts of light, shadow formation, and optical devices. 3. Procedural: The steps of the object can be seen by the eye. **Technology**: Introducing modern (digital) camera technology. **Engineering**: Create a simple optical device model. **Mathematic**: Counting the number of shadows on the eyes of insects.
4.12	Presents the results of experiments on the formation of shadows on mirrors and lenses.		

Table 3. Mapping Basic Competencies of Secondary School Class IX in Even Semester

Basic Competency		Local Wisdom (Ethno)	STEM Analysis
3.6	Applying the concepts of magnetism, electromagnetic induction, and the utilization of magnetic fields, including in everyday life including the movement/navigation of animals in search of food and migration.	Apply the concept of magnetism through magnetism in everyday life in ponds, industries, and agriculture in the Sidoarjo region.	**Science**: 1. Factual: Observing magnets and the utilization of magnets in pond, industrial, and agricultural areas. 2. Conceptual: Understanding the concepts of magnetism, electromganetic induction, utilization of magnetic fields, and navigation of animals in search of food and migration. 3. Procedural: The steps of making magnets. **Technology**: Introduces technology

Basic Competency		Local Wisdom (Ethno)	STEM Analysis
4.6	Create simple works that utilize the principles of electromagnetic and/or electromagnetic induction.		that uses magnets (bicycle dynamos). **Engineering**: Makes a simple electric bell. **Mathematic**: Calculated the number of spikes attached to the rod magnet in the experiment.
3.7	Apply the concept of biotechnology and its role in human life.	Apply the concept of biotechnology through the center of the tempeh and tofu industry and the center of the fermented milk industry in Sidoarjo.	**Science**: 1. Factual: Observe the manufacture of tofu, tempeh, and fermented milk. 2. Conceptual: Understanding the concept of biotechnology and its role in human life. 3. Procedural: Steps to make tempeh, tofu, and fermented milk. **Technology**: Introduces pasteurization technology in milk to make it durable. **Engineering**: Makes tofu maker tools simple. **Mathematic**: Calculates the protein content of plants and animals in conventional biotechnology processing.
4.7	Make one of the conventional biotechnology products that exist in the surrounding environment.		
3.8	Linking the concept of matter particles (atoms, ions, and molecules) simple substance structure with the properties of materials used in everyday life as well as the impact of material use on human health.	Connecting the concepts of matter particles (atoms, ions, and molecules) through smoke particles, the properties of industrial waste materials, ponds and agriculture in the Sidoarjo region.	**Science**: 1. Factual: Observing factory smoke, the nature of materials present in industry, add, and rice fields. 2. Conceptual: Understanding the concept of matter particles, the nature of materials as well as the impact of the use of materials on human health. 3. Procedural: Industrial waste disposal measures, ponds, and rice fields. **Technology**: Introducing modern technology of making clothing materials. **Engineering**: Makes a model of the difference between atoms, ions, and molecules. **Mathematic**: Calculates the content of polluted waste in ponds, industries, and rice fields.
4.8	Presents the results of investigations on the nature and utilization of materials in everyday life.		
3.9	Linking the physical and chemical	Linking the physical and	**Science**: 1. Factual: Observing the land in the

Basic Competency		Local Wisdom (Ethno)	STEM Analysis
	properties of soils, organisms that live in soils, and the importance of soil to the sustainability of life.	chemical properties of soils through the characteristics of farmlands, rice paddies, and industry in the Sidoarjo region.	pond, industrial, and rice fields. 2. Conceptual: Classifying soil characteristics associated with physical and chemical properties. 3. Procedural: The steps of observing the constituent components of the soil. **Technology**: Introduces modern technology in tilling soil. **Engineering**: Making a model of the constituent components of the soil. **Mathematic**: Calculates the content of soil components in a certain size.
4.9	Presents the results of investigations on the properties of the soil and the importance of the soil to life.		
3.10	Analyze environmentally friendly technology processes and products for the sustainability of life.	Analyze environmentally friendly technology processes and products through UKM using environmentally friendly technology in the Sidoarjo region	**Science**: 1. Factual: Observing environmentally friendly technology carried out by UKM in Sidoarjo. 2. Conceptual: Understanding environmentally friendly technological processes and products for the sustainability of life. 3. Procedural: Steps using environmentally friendly technology. **Technology**: Introducing environmentally friendly technology. **Engineering**: Making technology tools environmentally friendly. **Mathematic**: Calculating the advantages of using environmentally friendly technology.
4.10	Presents work on simple technology processes and products that are environmentally friendly.		

2. Natural Science based Ethno-STEM Learning Device and Instrument Development Module

   This module is structured to facilitate natural science teachers in developing natural science based ethno-STEM learning devices and instruments. Modules equipped with practical examples of these learning devices and instruments, are expected to be able to equalize the perception of service and teachers in developing based ethno-STEM devices and instruments.
3. Ethno-STEM-based IPA Learning Device and Instrument Development Training

   The training was conducted from December 30, 2020 to January 2, 2021 with online and on job training (OJT), where activities include:
   a. Ethno-STEM socialization

b. Practical Examples of Natural Science based Ethno-STEM Learning (HOTS Devices and Instruments)
c. Discussion and Q&A
d. Selection of Basic Competence of Natural Science in Secondary School on Even Semester
e. Design of Natural Science based ethno-STEM learning devices
f. Natural science based Ethno-STEM learning device consultation
g. Design of natural science based ethno-STEM learning instruments
h. Natural science based Ethno-STEM learning instrument consultation
i. Natural science based Ethno-STEM learning instruments
j. Review and evaluation of training activities

4. Teacher Response questionnaire to training

The questionnaire to describe the teacher's response to the training conducted is filled using a google form link: <https://forms.gle/3Jh8CjNe3axAF2tM7> obtained the following results:

Table 4. Teacher's Response to Training

Nu	Indicator of Response Training	Response Percentage (%)				
		VA	A	N	DA	VD
1	Trainee requirements	40	42.5	17.5	0	0
2	Interests and motivations of trainees	15	60	25	0	0
3	Professional ability of trainers/ trainers	37.5	52.5	10	0	0
4	Social skills of trainers/ trainers	50	45	5	0	0
5	Personal skills of trainers/ trainers	47.5	45	7.5	0	0
6	Training facilities and infrastructure	27.5	57.5	20	0	0
7	training materials	67.5	27.5	5	0	0
8	Effectiveness of training	35	65	10	0	0
Rerata		**40**	**49**	**11**	**0**	**0**

Very Agree = VA, Agree =A, Neutral =N, Disagree =DA, Very Disagree =VD

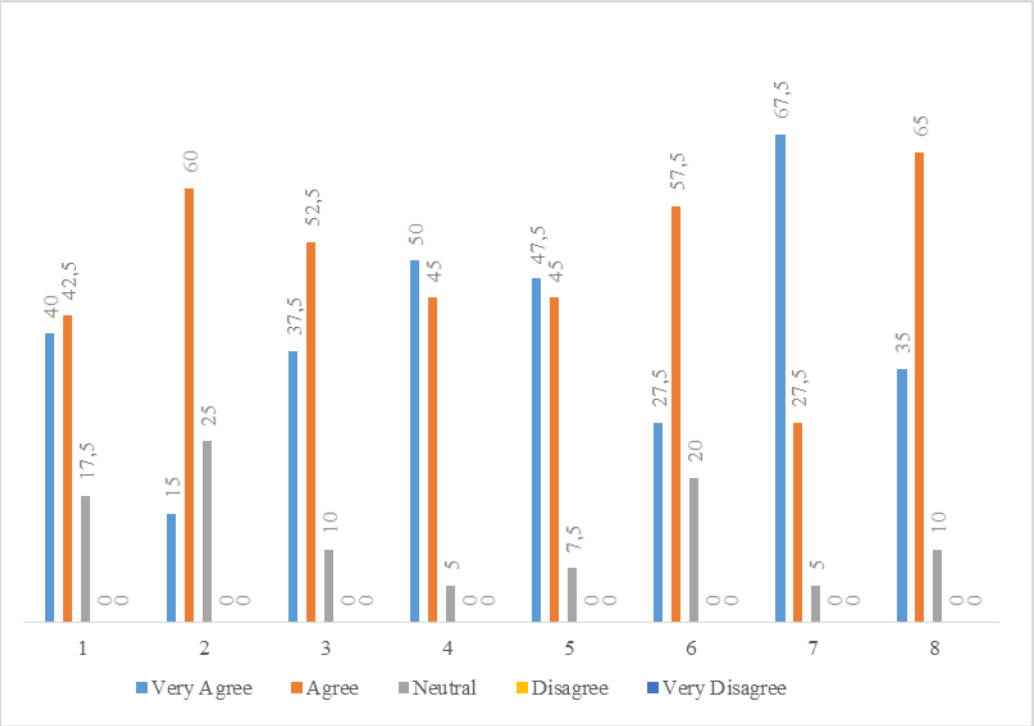

Figure 1. Diagram Respon Guru terhadap Pelatihan

Based on Table 4 and Figure 1, data obtained 89% of teachers responded positively and 11% of teachers responded negatively to the training that has been done.

DISCUSSION

Based on the data obtained, has mapped the basic competence of secondary school with natural science based ethno-STEM for even semesters, this mapping serves as a basis for teachers in developing learning devices and instruments. Each teacher develops one basic competency, so that all basic competencies of junior high school class VII, VIII, and IX even semesters can be developed natural science learning devices and instruments based ethno-STEM. Modules are designed by the service team, which contains ethno-STEM concepts starting from a background, theoretical and empirical foundation, practical examples in natural science learning. This module is further shared with teachers as a basis for developing natural science based ethno-STEM learning devices and instruments. Training activities are carried out as many as 32 hours of lessons, until the results of natural science based ethno-STEM learning devices and instruments. After the training series is completed, the servicer spreads the questionnaire and gets a positive response of 89% and a negative response of 11%. The results of this training were subsequently published in the online mass media. Thus it can be said that through this training, teachers are able to complete learning devices and instruments in accordance with targets and expectations despite obstacles, but these obstacles can be overcome.

This is also in line with the results of community service from Harjono, et al [11], this activity takes place well and in accordance with the objectives and participants can develop natural science learning community integrated 21st century skills and needed continuous coaching and development with related agencies. Likewise the results of community service Ardiansyah, et al [12], the results or achievements of this activity are presented descriptively by showing that the ability of natural science teachers in compiling learning devices in the form of lesson plan and student worksheet is as follows: 1) 90% learning device format. 2) Basic Competency conformity and Probem based Project Learning Model 50%, 3) Probem based Project Learning syntax accuracy 70%, and 4) worksheet conformity with 60%. The results of community service from Fitri and Kusumaningtyas [13], the impact of this training is that muhammadiyah secondaryq

school teachers are able to compile natural science based STEM learning devices and are able to practice them in the classroom.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of achievements that have been done in abdimas activities, it can be concluded that the training of the development of natural science based ethno-STEM learning devices and instruments for Muhammadiyah Secondary School Teachers in Sidoarjo, responded positively by teachers by 89%. This proves that teachers have great motivation for training activities. The output of the training activities is to produce natural science based ethno-STEM learning devices and instruments for Class VII, VIII, and IX on Even Semesters. Preparation before mentoring has been done, but there are obstacles that make the coordination of service and partners disrupted, this is because the activities are carried out online through synchronic (zoom meeting application) and asynchronous through WhatsApp Group. This is also because new partners know the servicers, so coordination does not run smoothly, it takes the completion time of old devices and instruments, the estimate of one mingu can be up to 3 weeks, due to revisions. Nevertheless, enthusiastic partners remain good because this learning strategy is new. There are several obstacles faced, the servicer provides advice: 1) mentoring activities are carried out offline so that there is enthusiasm and motivation because directly, but the anticipation of this pandemic outbreak makes offline activities reluctant to be done, 2) it is not easy to make connections / chemistry to partners, it takes a long time, because this activity involves 10 schools where the location is different, and first, and 3) should advice and improvement of mentoring activities from partners be taken into consideration for similar activities.

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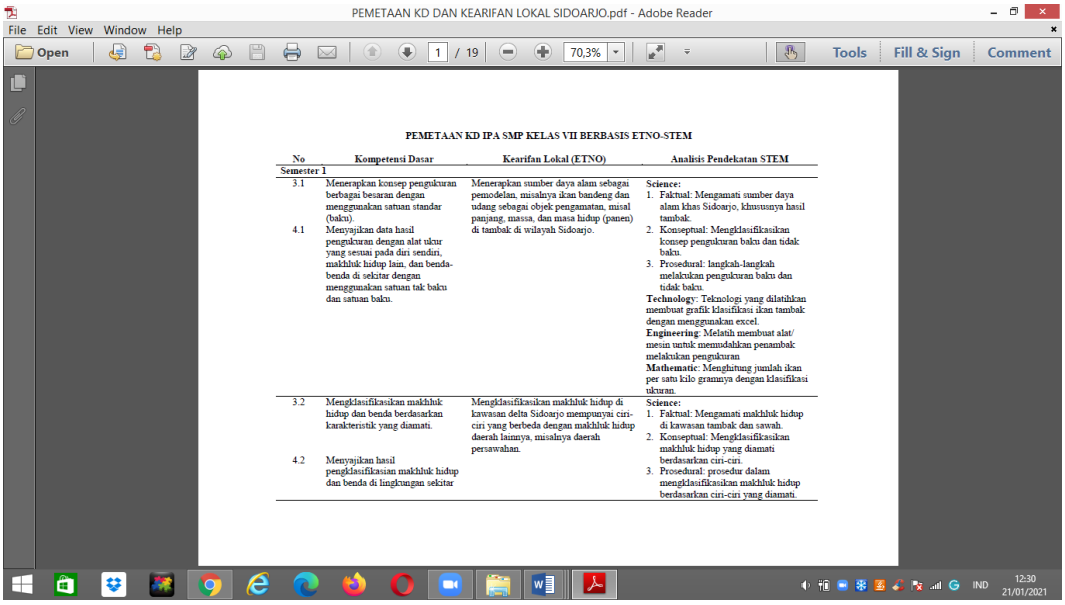
APPENDIX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PEMETAAN KD IPA SMP KELAS VII BERBASIS ETNO-STEM

No	Kompetensi Dasar	Kearifan Lokal (ETNO)	Analisis Pendekatan STEM
Semester 1			
3.1 4.1	Menerapkan konsep pengukuran berbagai besaran dengan menggunakan satuan standar (baku). Menyajikan data hasil pengukuran dengan alat ukur yang sesuai pada diri sendiri, makhluk hidup lain, dan benda-benda di sekitar dengan menggunakan satuan tak baku dan satuan baku.	Menerapkan sumber daya alam sebagai pemodelan, misalnya ikan bandeng dan udang sebagai objek pengamatan, misal panjang, massa, dan masa hidup (panen) di tambak di wilayah Sidoarjo.	**Science:** 1. Faktual: Mengamati sumber daya alam khas Sidoarjo, khususnya hasil tambak. 2. Konseptual: Mengklasifikasikan konsep pengukuran baku dan tidak baku. 3. Prosedural: langkah-langkah melakukan pengukuran baku dan tidak baku. **Technology**: Teknologi yang dilatihkan membuat grafik klasifikasi ikan tambak dengan menggunakan excel. **Engineering**: Melatih membuat alat/ mesin untuk memudahkan penambak melakukan pengukuran **Mathematic**: Menghitung jumlah ikan per satu kilo gramnya dengan klasifikasi ukuran.
3.2 4.2	Mengklasifikasikan makhluk hidup dan benda berdasarkan karakteristik yang diamati. Menyajikan hasil pengklasifikasian makhluk hidup dan benda di lingkungan sekitar	Mengklasifikasikan makhluk hidup di kawasan delta Sidoarjo mempunyai ciri-ciri yang berbeda dengan makhluk hidup daerah lainnya, misalnya daerah persawahan.	**Science:** 1. Faktual: Mengamati makhluk hidup di kawasan tambak dan sawah. 2. Konseptual: Mengklasifikasikan makhluk hidup yang diamati berdasarkan ciri-ciri. 3. Prosedural: prosedur dalam mengklasifikasikan makhluk hidup berdasarkan ciri-ciri yang diamati.

Figure 2. Mapping Basic Competencief of Natural Science of Secondary School Class VII, VIII, and IX into ethno-STEM

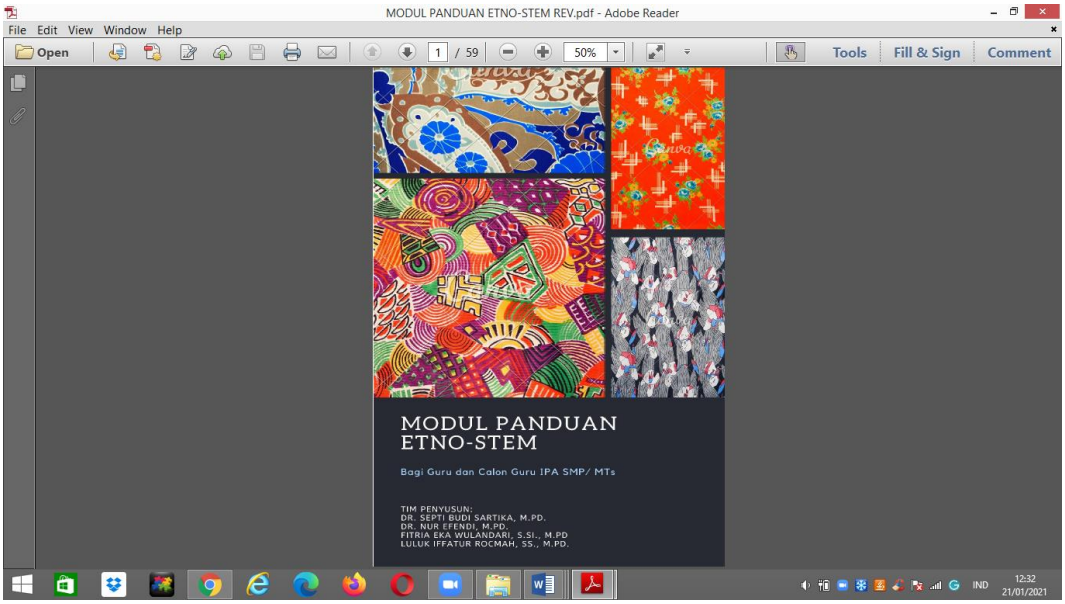

Figure 3. Ethno-STEM Guide Module features Practical Examples

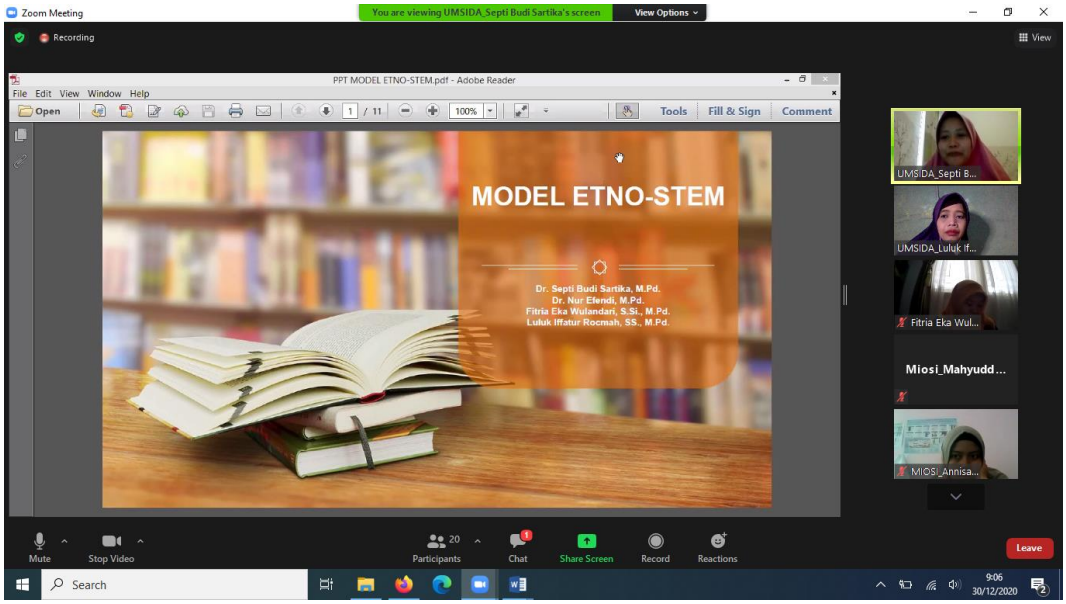

Figure 4. Natural Science based Ethno-STEM Learning Device and Instrument Development Training

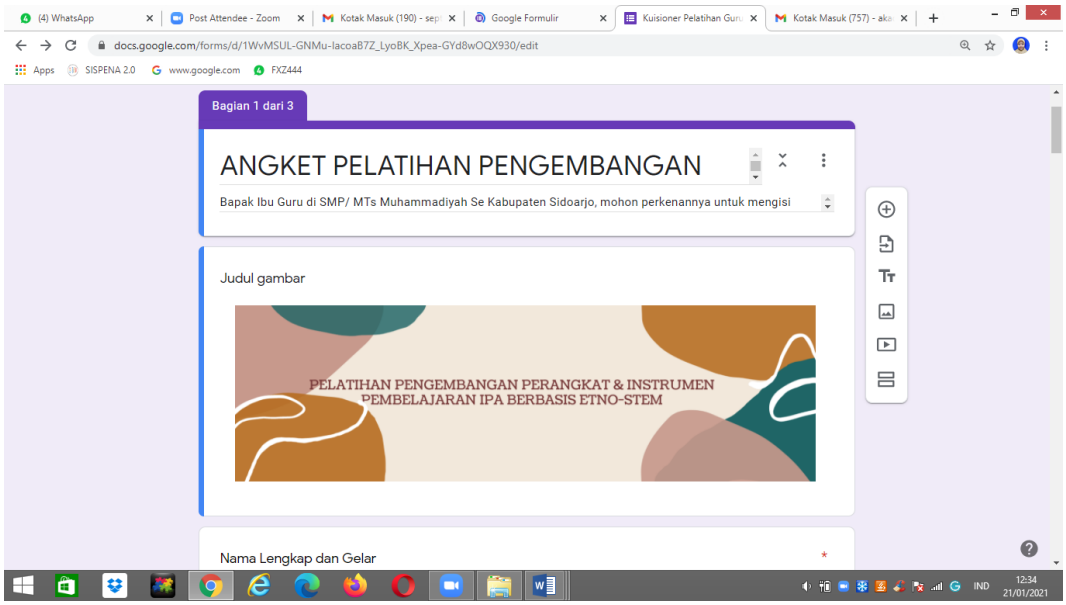

Figure 5. Natural Science based Ethno-STEM Learning Device and Instrument Development Training Questionnaire

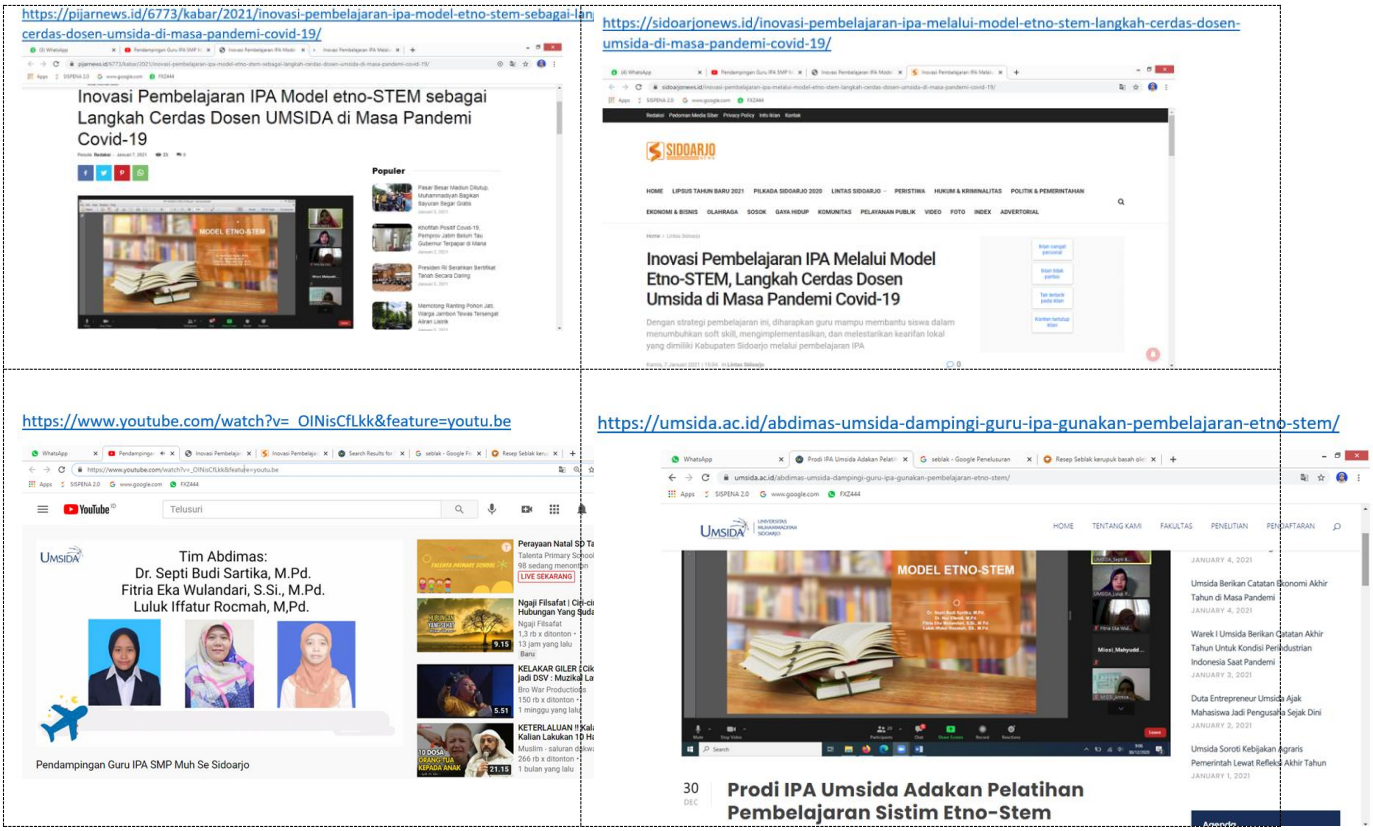

Figure 6. Publication of Abdimas Activities in Mass Media Online