



The Impact of Learning Basic Science Concepts Using the Ethno-Setsar Approach to Improve Communication Skills of Prospective Teachers

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Abstract: Communication skills really need to be provided to prospective teachers. Success This research aims to analyze the impact of Ethno-SETSaR science learning on prospective teacher communication. The research method used was an experiment with a non-equivalent group design. The sample of this research is 120 prospective teacher students. The data collection technique used is observation. The data analysis technique used is ANOVA. Hypothesis testing is that there are differences in communication skills between the experimental group and the control group. The research results obtained by the science learning program using the E-SETSaR approach can improve communication skills. Eight student communication indicators with scores greater than ≥ 65 for the experimental class. Conduct investigations, prepare investigation reports, discussions and presentations which are learning activities. Learning basic science concepts involves scientific investigation activities to find community problems related to the culture of the surrounding community to be studied from the SETSaR aspect to train communication skills. Therefore, learning is designed to facilitate students to think and convey their ideas.

Keywords: Communication skills; ESETSaR; Prospective teachers; Science Teaching

Introduction

Communication skills are skills that need to be provided to prospective teachers. Communication skills as essential skills for working in the 21st century (Savendra & Opfer, 2012). Communication skills are really needed by workers in industry, offices, government and education (Brownell et al., 2013) including prospective teachers. Good communication skills from a teacher affect a pleasant learning atmosphere, increase motivation, and achieve learning outcome (Morereale et al., 2015). Effective learning and achievement of student learning outcomes are influenced by teacher communication skills (Ekici, 2010). Teachers as initiators of effective communication in the classroom should have good communication skills. The communication made by the teacher has an impact on

the concepts received by students (Khan et al., 2017); increase motivation (Domenech et al, 2014); listen to the explanation (Bray et al., 2012); fun learning atmosphere and student interest (Duta et al., 2015), and student self-confidence (Erİgüç et al., 2013).

Oral communication skills for prospective teachers are the most important thing in transmitting science, insights and other important information (Bloju & Stan, 2013). Communication skills are useful as provisions for prospective teachers to identify sources of information as new knowledge and use information as additional knowledge in their own development (Kaburise, 2016). A teacher's communication skills as part of the element of professionalism assessment (Priatna & Sukanto, 2013). Therefore, the success of learning to achieve the goals carried out by the teacher cannot be separated from the communication skills he has. Communication

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plays a very important role in teaching and learning activities, which aim to transfer knowledge and exchange ideas or ideas (Sharifirad et al., 2012). Teachers who have low communication skills have the impact of not being able to convey information clearly (Naim, 2011), unable to manage a learning atmosphere that can increase student motivation (Jurik et al., 2014), failed to be a good mentor (Ambassador & Rafaila, 2015), unable to solve the problema (Morreale et al., 2014), and difficulty expressing emotions and making decisions (Khalik, 2014). Teachers who have low communication skills will have difficulty implementing effective learning, will have difficulty achieving learning outcomes for their students, and will not play an optimal role in communicating with students and colleagues.

The results of previous research illustrate the importance of teacher communication skills to support the success of their learning. Good teacher communication skills are a basic requirement for student academic success, and for successful professional life (Khan et al., 2017). Teaching generally requires fifty percent knowledge and fifty percent interpersonal or communication skills (Khan et al., 2017). Communication carried out by teachers has an impact on the concepts received by students and increases motivation (Domenech et al., 2014) listen to explanations (Bray et al., 2012); fun learning atmosphere and student interest (Duta et al., 2015), and student self-confidence (Eriguc et al., 2013).

Communication skills need to be possessed by prospective teachers in order to successfully carry out their duties as educators. Apart from that, communication skills such as discussions, presentations, investigations and writing reports as well as holding science exhibitions also need to be provided to students. Communication skills are a basic prerequisite for developing an understanding of learning and teaching (Tutkun, 2015). Student teachers who are preparing to become teachers need to have communication skills to be able to convey knowledge clearly and easily understood by students (Bee, 2012). However, teachers who have low communication skills have the impact of not being able to convey information clearly (Ahmatoglu & Pickles, 2016), teachers are unable to manage a learning atmosphere that can increase student motivation (Jurik et al., 2014), teachers fail to be good mentors (Ambassador & Rafaila, 2015), the teacher is unable to solve the problem (Morreale et al., 2015), and difficulty expressing emotions, solving problems, making decisions (Khalik, 2014). LPTK (Educational Personnel Education Institute) that produces teachers need to optimize the implementation of learning so that graduates have good teacher candidate communication skills.

One effort to improve prospective teacher communication is to present science lessons that present problems related to culture, studied from the Ethno-SETSaR (Ethnoscience, Science, engineering, technology, and religion) aspect. Indonesia is a country made up of various tribes, religions and cultures. Every province in Indonesia has a different local language. This diversity has been passed down from ancestors to the current generation regarding knowledge in the fields of health, plantations, agriculture, culinary and others. For example, Cirebon is known for its shrimp paste, Sidorajo is known for its processed milkfish, and Cilacap is known for its fish catches and processing. These conditions should be used by teachers to improve the learning process and learning outcomes. Local wisdom-based learning as a form of strategy for creating and designing learning experiences that integrate culture and improve students' ability to use scientific knowledge (Sardjiyo & Panen, 2005). Therefore, learning that connects science concepts that exist in society, which is called the science approach, needs to be implemented by educators. The ethnoscience approach conditions students to learn from the environment, society and culture that develops around where they live. This theory also asserts that individual cognitive acquisition occurs first through interpersonal (interaction with the social environment) and intrapersonal (internalization that occurs within oneself) (Sumarni, 2018). The advantages of learning science that connects with the culture of society are easy to feel, directly sensed, and often found so that it provides meaningful learning and students easily understand the material (Fuad et al., 2018; Wati et al., 2017). The results of previous research, learning that utilizes community culture in the form of knowledge about science can improve the communication of prospective teachers. Ethnoscience learning can improve scientific communication (Asnawi et al., 2017).

In addition to ethnoscience learning, STES (Science, Technology, Environment, Society) learning is a development of STS (Science, Technology, Society) learning train students to develop communication skills (Chowdhury, 2018). The STSE approach is a form of STS education that places great emphasis on understanding the relationship between science, technology, society and the environment. Indonesia is familiar with the learning term SETS which was developed by (Binadja, 1999). SETS discusses things that are real, that can be understood, can be discussed and can be seen which are studied from the aspects of science, environment, technology, and society and the relationship between these aspects (Binadja, 2005). SETS presents an opportunity to learn, see, and analyze scientific relationships in the context of various perspectives (Pedretti & Nazir, 2011). Important aspects of SETS

learning are critical social reconstruction, decision making, and sustainability action (Rosario, 2009). SETS learning characteristics according to (Binadja, 1999) namely (a) continuing to provide science teaching, (b) students are brought into situations to utilize scientific concepts and forms of technology for the benefit of society, (c) students are asked to think about various possible consequences that occur in the process of transferring science into technological forms, (4) students are asked to explain the relationship between the scientific elements being discussed and other elements in SETS which affect the relationship between these elements when converted into technological form, (5) in the context of constructivism, students can be invited to talk about SETS from various starting points, depending basic knowledge possessed by the students concerned. The results of research on the impact of SETS learning, namely decision-making skills, arguments and explanations (Pedretti & Nazir, 2011).

The development of STS research developed into SETS, and the development of STR research with religious aspects was presented to complete the integration between fields of knowledge. It was concluded that SETS research integrated with religion could increase student motivation at Najran University, Saudi Arabia (Ahmed, 2018). SETS research in Indonesia that integrates religious values concludes that students experience an increase in religious attitudes, discipline and responsibility (Wahyuni et al., 2017). SETS can improve students' decision making on problems and can relate them to Islamic values (Rahmaniati & Supramono, 2015). Integrating SETS and religion has an impact on cognitive and non-cognitive learning outcomes. Students gain more complete knowledge between SETS and religion so that learning carried out using the SETS approach is able to increase their motivation, stimulate thinking and working skills and attitudes. SETS integrated with Islamic values can improve understanding of the concept (Rahmah et al., 2017). Learning science integration of religion can increase motivation and understanding of concepts, provide meaningful learning experiences (Gamal & Mahalle, 2012) and thinking skills (Khasanah, 2018). Views, opinions, attitudes, and knowledge will be built by a person through interaction with the socio-cultural context in living history and interpreted as a religion adhered to (Mansour, 2008).

Approach is a starting point or point of view on the learning process to achieve learning goals (Arends, 2012). The E-SETSAR approach is a learning method chosen by teachers/lecturers so that students learn from the structure of scientific knowledge that they already have and are produced from the cultural processes of a particular society. The original scientific knowledge of the community is examined regarding aspects of the use

of science and technology used by the community to solve the problems they face and pay attention to environmental conservation. The approach aims to improve creative thinking, problem solving, and communication skills. The learning approach requires a learning model to achieve the planned goals.

Results of previous research, learning models which can improve creative thinking skills and problem solving as well as communication skills, namely applying problem-based learning, project-based learning and inquiry learning. Research result (Yoon et al., 2014) revealed that PBL (Problem Based Learning) has an important influence on students' creative thinking skills. PBL improves problem solving skills (Aidoo & Ofori, 2016). Student communication skills and learning outcomes improve by implementing PBL (Awang & Daud, 2015). Research on the science learning program with the E-SETSAR approach has a novelty, namely integrating community-based science from the perspective of SETS and religion. The research that has been carried out has only studied STS and SETS and has not studied religious elements. Science basic concept learning program using the E-SETSAR approach designed to improve communication skills. The aim of this research is to analyze the impact of the learning program. IPA uses the E-SETSAR approach.

Method

The experimental research method used in this research was Non-Equivalent Group Design. In this design there are four groups of students totaling 120 students who will be used as research samples and divided into one experimental group I and control group I from university X. In addition, the distribution of one experimental group II and one control group II from university Y. Experimental design presented in Table 1.

Table 1. Solomon Four Group Design Experiment Design.

Class	Pretest	Treatment	Posttest
Experimental Group I	Q 1	X	Q2
Control Group I	Q 3	-	Q4
Experimental Group II	-	X	Q5
Control Group II	-	-	Q6

Source: (Sugiyono, 2010)

Information : X = treatment of the implementation of science learning programs using the E-SETSAR approach

Q = initial and final measurement for experimental group

The subjects of this research were 120 prospective elementary school teacher students in semester 3. The research sample was determined by a purposive sampling technique. The use of purposive sampling was based on similarities in names and achievements in basic science concepts courses. The instrument used to measure interpersonal communication skills is in the form of observation based on the elements of interpersonal communication according to (Devito, 2013). The communication skills instrument consists of 11 items from the indicators of sending and receiving, adaptation, messages, communication channels, noise, context, impact, and ethics. The instrument was content validated to obtain a good instrument in the measurement process. This research used four groups. To find out the differences in creative thinking, problem solving and communication skills in all research groups, the one way ANOVA test was used. Analysis of variance or ANOVA is a multivariate analysis technique that serves to distinguish the means of more than two groups. Before carrying out the ANOVA test, it is necessary to test assumptions including normality, homogeneity and random sampling (Ghozali, 2009).

Result and Discussion

To determine differences in communication skills in these groups, a one-way ANOVA test was carried out using SPSS 16. The normality test was carried out using the Shapiro Wilk assumption on the basis of the number of samples in this study of less than fifty for each group. The results of normality and homogeneity testing are presented in Tables 2 and 3.

Table 2. Normality of Communication Skills Data

Data Group	Significance value	Information
1	.355	Normal data
2	.161	Normal data
3	.307	Normal data
4	.068	Normal data

Based on Table 2, decisions are made to conclude that the data is normally distributed based on significance values. If the significance value is >0.05 then all data is normally distributed. The significance value of the Communication data for the four groups is >0.05 , so it is concluded that the data is normally distributed and can be continued for hypothesis testing.

Table 3. Communication Skills Data Homogeneity Test

Levene				Information
Statistics	df1	df2	Sig.	
.977	3	116	.406	homogeneous data

One way ANOVA testing to determine whether there are differences in communication skills between groups. The results of the oneway anova test are presented in Tabel 3.

Table 3. One Way Anova Test Data Communication Skills

F value	Significant Value	Information
195.312	.000	There is a difference

Based on Table 3, decision making to conclude that there are differences between groups based on significance values. If the significance value is <0.05 then there is a mean difference between groups. The significance value of the problem solving data for the four groups was <0.05 , so it was concluded that there were differences between groups.

Communication skills refer to understanding and applying the process of sending and receiving both verbal and nonverbal messages (Wilkins et al., 2015), is interactive (Ramaraju, 2012), sensitive to the feelings and emotions of others around him (Devito, 2013). Measurement of communication skills is based on observer assessments and online learning recordings. The research results obtained for indicators of receiving and sending messages.

The indicator of receiving and sending messages has the highest score of the other 7 indicators. Students already have the skills to send and receive messages well. Students have conveyed messages that can be understood by listeners and received messages from other people so that communication runs smoothly when learning takes place. Investigative learning activities to find solutions to problems in groups practice sending and receiving messages through the discussion process. Indicators of competence in adapting to communication are based on the context of interaction and the person with whom you communicate.

The self-adjustment indicator has the smallest score of the other 7 indicators. Students have learned to control themselves to consider speaking time, intonation, communication situations so that communication runs smoothly when learning takes place. Investigative learning activities to find solutions to problems in groups train adjustments through the discussion process.

Message form indicators are the process of sending information in the form of sound, images, or a combination of these. During the communication process there is an exchange of feedback between communicators. Based on an assessment of the feedback, the communicator can adjust, add, strengthen or change the content of a message. The message form indicator has the second lowest score of the other 7 indicators. Students have conveyed messages in various forms,

such as displaying images sourced from the internet and power points so that communication runs smoothly during learning. Investigative learning activities to find solutions to problems in groups train message form skills through discussion and presentation processes.

Communication channel indicators are intermediaries that provide a way to convey a message. Generally, in communication, a communicator uses more than one channel simultaneously. For example, in face-to-face communication, the communication channel consists of sound, visual and olfactory channels. The communication channel indicator has the third lowest score of the 7 other indicators. Students already have verbal and non-verbal communication skills simultaneously during the communication process. Students have communicated in written form from the prepared investigation report. In addition, students develop oral communication during the discussion process so that communication runs smoothly when learning takes place. Noise indicators are anything that can interfere with sending messages. There are 3 types of noise, namely physical, psychological, and semantic. The way to reduce noise is through choosing effective sentences, increasing the ability to receive and send messages, and increasing perceptual, hearing and feedback ability. The noise indicator ranks 5th largest out of 7 other indicators. Most students no longer have barriers to communication.

Students' skills in managing noise during the communication process are in the good category. Students are able to manage psychological communication barriers such as nervousness, trembling, and stuttering in communication. In addition, students are able to manage communication barriers that are semantic, for example choosing words that are not appropriate, and the arrangement of sentences that are not in sequence so that communication runs smoothly when learning takes place. Investigative learning activities to find solutions to problems in groups practice

communication noise management skills through discussion and presentation processes. Context indicators influence the form and content of communication. The communication context has at least four dimensions, namely physical, temporal, social psychological and cultural dimensions. The communication context indicator ranks 4th largest out of 7 other indicators. Students have communication context skills to consider physical, psychological and cultural aspects in communicating. Students are able to use Indonesian because the group members come from Java and outside Java. Investigative learning activities to find solutions to problems in groups train communication context skills through discussion and presentation processes.

The communication impact indicator is the effect of communication on the individuals involved in the process. If communication has an impact on the environment or context, then that impact will be felt by the opponent of the communication. The communication context indicator ranks 3rd largest out of 7 other indicators. Students have good communication impact skills. There was no debate that resulted in failed communication because all groups submitted investigation task reports in a timely manner. Investigation learning activities to find solutions to problems in groups practice communication impact skills through discussion and presentation processes.

Communication ethics indicators are criteria for assessing the good or bad of a communication act. Students have good ethics in communicating. Students are able to use polite values when communicating, such as using words that are not rude, waiting to speak when other people are still talking, using good choice of words. Investigative learning activities to find solutions to problems in groups train ethical skills in communication through discussion and presentation processes.

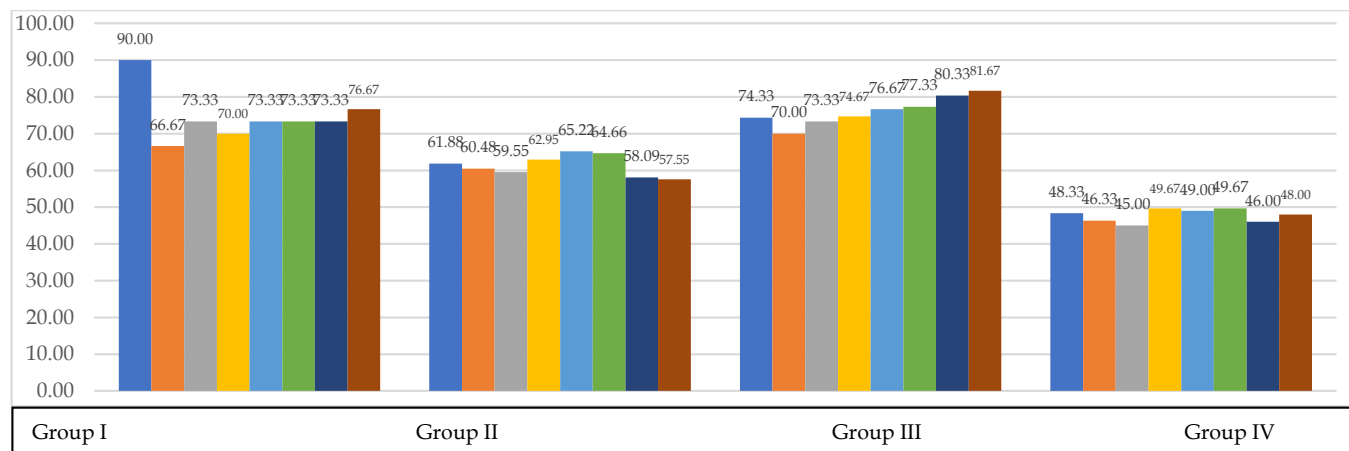


Figure I. Communication Skills

Science learning programs using the E-SETSAR approach can improve communication skills. Eight student communication indicators with scores greater than ≥ 65 for the experimental class. This score indicates that seven indicators of communication skills are above average but have not yet reached optimal. Improving communication skills develops from learning activities to present problems, conduct investigations, prepare investigation reports, discussions and presentations which are learning activities in the science learning program with the E-SETSaR approach. Learning activities of investigation, preparing reports, discussions and presentations train students to have good communication skills. To train students' communication skills, lecturers must provide discussions and oral presentations, (Joseph, 2010 ; Noviyanti, 2011), presenting science exhibitions, presenting science with local culture (Perera & Stocklmayer, 2013).

Increasing creative thinking, problem solving and communication skills as a result of learning basic science concepts using the ESETSAR approach facilitates these skills. This learning program connects the culture of the surrounding community and is studied in learning so as to support contextual learning for prospective teachers. Native culture and Western (alternative) modern science culture may complement each other in students' everyday world experiences. The introduction of ethnoscience in the classroom will represent different cultural backgrounds and may help improve the interpretation of knowledge (Botha, 2012), thereby making science more relevant to students in culturally diverse classrooms (de Beer et al., 2022). The integration of indigenous knowledge into the school curriculum may help to enable students to have positive experiences and develop appropriate attitudes towards science. The ethnoscience approach helps students to maintain their local cultural wisdom values (Ngaske, 2011; Perin, 2011).

One of the factors increasing the communication potential of prospective teachers besides ethnoscience as a learning resource is the activity of studying the SETSaR aspects presented in learning. SETSaR studies on the production of shrimp paste, smoked fish, and milkfish ponds can be used as meaningful learning resources and provide holistic knowledge for prospective teachers. The characteristics of SETS learning present contextual problems and issues that require solutions through assessing aspects of science, environment, technology, and society (Binadja, 2005; Pedretti & Nazir, 2011; Zoller, Zoller). This learning program is designed according to the characteristics of SETS learning. The purpose of SETS is to provide interdisciplinary knowledge between science, technology, environment and society as well as the improvement of critical thinking, decision-making.

The advantage of SETS is that it forms graduates who have reasoning abilities and comprehensive

thinking when students are faced with a problem to solve (Binadja, 2005). The religious aspect presented in this program aims to increase knowledge about the traditions that have been passed down by certain communities so as to provide knowledge. The approach integrates science and religion and tries to bring religious beliefs closer to scientific theory (Aflalo, 2018). Views, opinions, attitudes and knowledge will be built by a person through interaction with the socio-cultural context in life history and interpreted as the religion they adhere to (Mansour, 2007).

Conclusion

Science learning programs using the E-SETSAR approach can improve communication skills. Eight student communication indicators with scores greater than ≥ 65 for the experimental class. Improving communication skills develops from learning activities to present problems, conduct investigations, prepare investigation reports, discussions and presentations which are learning activities. Learning basic science concepts involves scientific investigation activities to find community problems related to the culture of the surrounding community to be studied from the SETSaR aspect to train communication skills. Therefore, learning is designed to facilitate students to think and convey their ideas.

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Author Contributions

M.Jhoni constructing and reviewing the literature. M. Hasbi reviewed the literature and edited the manuscript by Winarto. All authors read and approve the final manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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