



EFFECTIVENESS OF SUBSTANTIVE TECHNICAL EDUCATION AND TRAINING FOR ISLAMIC SENIOR HIGH SCHOOL BIOLOGY TEACHERS

Budiyono Saputro^{1,✉}, Budi Lestari², Fenny Widiyanti³, Heru Saputra⁴

^{1,3} Science Education, Faculty of Teacher Training and Education, State Institute of Islamic Studies (IAIN) Salatiga, Indonesia

² Religious Educations and Training Center, Semarang, Indonesia

⁴ English Education, Faculty of Teacher Training and Education, State Institute of Islamic Studies (IAIN) Salatiga, Indonesia

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Abstract

The purpose of this study was to determine the effectiveness of substantive technical education and training program for Islamic High School (Madrasah Aliyah/MA) throughout Central Java and Yogyakarta. Quantitative research with "One-Group Pretest-Posttest Design" research design was used. Population and samples were taken from all Biology teachers throughout Central Java and Yogyakarta with a total of 33 participants. Instruments for data retrieval were questions about pretest and posttest. The data were in the form of participants' pretest and posttest results. Based on the Wilcoxon test results, it obtained t count -3.083, while $p = 0.002 < 0.05$, it could be concluded that substantive education and training can effectively improve the material mastery for Madrasah Aliyah biology teachers. The materials were the analysis of Graduate Competence Standard (SKL), Core Competence (KI), Basic Competence (KD), Biology Indicators of Madrasah Aliyah, essential material of anatomy and physiology of animals and plants, cells, animal and plant tissues, metabolic processes, biotechnology and their application, genetic in inheritance, and the practice of Madrasah aliyah biology learning.

✉Corresponding author:

Budiyono Saputro

Science Education, Faculty of Teacher Training and Education,
State Institute of Islamic Studies (IAIN) Salatiga, Indonesia
Email: budiyonosaputro@iainsalatiga.ac.id

INTRODUCTION

Education is a process of improving the life of the nation and the means to develop Indonesian people as a whole. The success of national development is also determined by the quality of its human resources, in terms of decision makers, policy makers, thinkers and planners, even the technical implementers and development supervision actors. Human resources (HR) occupy an important and very strategic position. Human resources are human capital and intellectual capital which will determine the effectiveness of other factors in the organization such as capital, tools, organizational technology, and structure (Sedarmayanti, 2018).

The development in the field of education is an important part of developing and improving the quality of human resources to become an independent society. The state civil apparatus has a role that determines the success of state administration and development. A qualified apparatus is an apparatus that has the skills and ability to carry out every task assigned to him well, and is able to maintain and develop his skills and abilities on an ongoing basis (Prilianti, 2018). Improving the quality of professionalism and developing the insight of the state civil apparatus are needed to create human resources of apparatus who have such competencies.

The efforts taken by the Government in improving the quality of professionalism and the development of insights of the state civil service are through the Education and Training program. The Education and training program for the state civil apparatus is directed at: a) the improvement of attitudes and spirit of service-oriented to the interests of society, nation, state and homeland, b) the improvement of technical, managerial and / or leadership competencies, c) the improvement of efficiency, effectiveness and quality of the tasks carried out in the spirit of cooperation and responsibility in accordance with the work environment and organization. Simamora, (2004) argues, "training is a learning process that involves acquiring skills, concepts, rules, or attitudes to improve performance". According to Charismi

et. al (2016), training is an intermediary tool to train prospective workers to gain knowledge and train candidates and workers to be able to face competition in the world of work, while Sulaefi (2017) concludes that training and development of HR affects the work discipline and the performance of the employee. In line with the opinions and results of research on education and training, Wiyatmo *et al.* (2017) concluded in the results of his research that training in the making of learning media for Natural Sciences can contribute to participants having knowledge in designing teaching aids, possessing skills in designing teaching aids in Natural Sciences, and being skilled in using natural science teaching aids.

The implementation of education and training aims (1) to increase knowledge, expertise, skills and attitudes of the employees to be able to carry out professional assignments based on personality and employee ethics in accordance with the needs of the Ministry of Religion, (2) facilitating the apparatuses to be able to act as reformers and unify the nation, (3) strengthening the orientation of attitudes and the spirit of service-oriented, protecting and empowering the community and (4) producing qualified, professional, integrity and responsible employees (Prilianti, 2018). The results of the study supporting the statement above are the research conducted by Ertikanto *et. al.* (2015), showing that the ability of science teachers was comparable and increased after participating in the inquiry approach training program. The results of the same study were obtained by Wati (2011) which showed that effective training is a forum that is useful for making effective English language teachers. Thus, effective training can improve the ability of science teachers in particular. According to Julifan (2017), an activity or work can be completed by choosing the methods that have been determined and the method is effective.

Assessment / measurement of the effectiveness of education and training has four levels (Kirkpatrick, 2006), namely: (1) Reactions / responses. Measuring education and training at this level is to assess the feelings and the opinions of the participants in education and training on education and

training programs. At this level, measuring reactions / responses to education and training include: reactions to education and training curricula, reactions to teaching trainers, reactions to facilities and infrastructure used in education and training. The reactions can determine the effectiveness of the implementation of education and training programs, as well as the feelings of participants in the experience of education and training. (2) Learning. The measurement of learning will assess the extent to which participants master the concepts, information, and expertise taught during the education and training process. (3) Behavior. Behavioral measurement is measured based on the behavior of participants in education and training. (4) Result. The aspect of measurement of the results is a change in the institution after the teachers / employees participate in the training.

The types of education and training consist of pre-service education and training and in-service education and training. In-service education and training are education and training carried out to develop knowledge, skills and attitudes in order to carry out government and development tasks as well as possible. In-service education and training consist of leadership education and training, functional education and training and technical education and training. Technical education and training is education and training that is carried out to meet the technical competency standards of the employees in accordance with the needs of their respective duties. Technical education and training consist of substantive technical education and technical training and general/ administrative and management technical education and training.

The implementation of education and training for Biology teachers at the Islamic Senior High Schools is included in substantive technical education and training. Substantive technical education and training is education and training that is held to provide substantive knowledge and skills in order to achieve competencies related to the work in question, so as to be able to carry out their duties and responsibilities professionally. This is in line with the results of research by Rochintaniawati

et. al, (2018) showing that the development of teacher pedagogy knowledge can be influenced by internal and external factors.

Another essence of the implementation of education and training for Biology teachers in Islamic Senior High Schools in Central Java and the Special Region of Yogyakarta at the Religious Education and Training Center in Semarang, Central Java, Indonesia is to provide innovative supplies of biology learning in schools and updates on biology learning materials. This is very important because it can keep up with the dynamic development of science. Xuan (2019) expressed that training can enrich teacher experience. Widodo et al. (2015) in his research also showed that teachers and supervisors benefited from collaborative education and training. The benefits are the flexibility of training activities, in terms of teacher interaction with training materials, the interaction of teachers with supervisors and the interactions between fellow teachers to implement full participation of the participants. The participants can also collaborate integratively with the facilitator. Collaborative and integrative participatory education and training can provide higher motivation to participants. Thus, the goals of education and training will be achieved easily. Whereas Nugroho (2017) stated that In House Training (IHT) is a recommended form of training to improve the competence of remote elementary school teachers.

METHODS

This research is quantitative research with the design of "One-Group Pretest - Posttest" (Sugiyono, 2013). The research design scheme is shown in Figure 1.

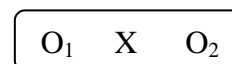


Figure 1. "One-Group Pretest-Posttest Design".

- 1) O₁ is the score of the pretest (before participating in the substantive education and training of biology material) while O₂ is the posttest score (after participating in substantive biology material education and training). The population and sample of this

study were all biology teachers in Islamic Senior High Schools in Central Java and the Special Region of Yogyakarta with a total of 33 participants. The instrument for data collection is questions for pretest and posttest. The data of this study were in the form of pretest and posttest for biology teachers from Islamic Senior High Schools in Central Java and the Special Region of Yogyakarta in 2018 in the Central Java religious education and training center, Semarang-Indonesia. The data analysis technique was using t-test. The data from the pretest and posttest results were processed by using the data normality test. If the data is normally distributed, then a parametric test (paired t-test) is carried out, whereas if the data is not normally distributed, then non-parametric test (Wilcoxon test) is carried out.

RESULTS AND DISCUSSION

Based on the results of the need analysis in the focus group discussion at the education and training center of the Indonesian Ministry of Religion, the results are as follows: (1) substantive education and training is needed for Islamic Senior High School biology teachers in Central Java and the Special Region of Yogyakarta, (2) the materials of substantive education and training for biology teachers of Islamic Senior High Schools are the analysis of Graduates' Competency Standards, Core Competencies, Biology Competencies and Islamic Senior High School indicators, essential material of anatomy and physiology of animals and plants, essential material of cells, animal and plant tissues, essential material of metabolic processes, essential material of biotechnology and its application, essential material of genetic in inheritance, the practice of biology learning in Islamic Senior High Schools. This is in accordance with the results of the research by Tapilouw *et. al.* (2017) that science teacher training program is tailored to needs, with methods of discussion and sharing. Material is also important in the Junior High School science teacher training program. In line with Admoko & Supriyono (2016), the training

activities are carried out according to the wishes and needs of the training participants.

The implementation of substantive education and training at the Central Java and the Special Region of Yogyakarta Religious Education and Training Center was held for three weeks in August 2018. Educational and training activities began with pre-test, biology material, practice in preparing learning tools and ended with post-test. Based on the results of the participants' pretest and posttest and the substantive training of biology teachers, the data description was obtained as in table 1.

Table 1. Data Description of Pretest dan

N	Valid	Pretest	Posttest
		33	33
	Missing	0	0
	Mean	71.5758	75.0909
	Median	72.0000	76.0000
	Mode	76.00	76.00
	Std.	5.65149	4.21577
	Deviation		
	Variance	31.939	17.773
	Minimum	58.00	64.00
	Maximum	80.00	82.00
	Sum	2362.00	2478.00

Posttest of the education and training

Based on table 1, the description of pretest data is that the average is 71.58, the mean value is 72.00, the scores that often appear are 76, the lowest score is 58.00 and the highest score is 80, and the total value is 2362.00. While the description of posttest data is that the average is 75.09, the mean value is 76.00, the scores that often appear are 76, the lowest score is 64.00 and the highest score is 82 and the total value is 2478.00. The histogram of pretest and posttest data description can be interpreted in Figures 2 and 3.

Figure 2. The histogram of pretest data of substantive education and training of Islamic

posttest – pretest	
Z	-3.083 ^b
Asymp. Sig. (2-tailed)	0.002

Senior High School biology teachers

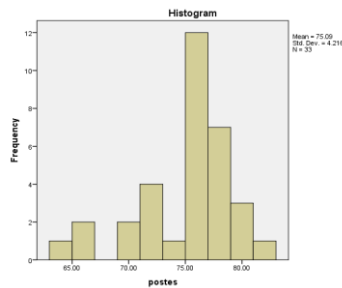


Figure 3. The histogram of posttest data of substantive education and training of Islamic Senior High School biology teachers

The pretest and posttest data of the material of substantive education and training of

Shapiro-Wilk			
	Statistic	df	Sig.
pretest	0.919	33	0.017
posttest	0.886	33	0.002

Islamic Senior High School Biology teachers were tested for the data normality. The result is shown in Table 2.

Table 2. The result of data normality test of the pretest and posttest of the material of the education and training

Table 2 is the result of the data normality test using SPSS. The result of the Shapiro-Wilk data normality test obtained the significance (p) of pretest was 0.017, $p < 0.05$ and significance (p) of posttest was 0.002, $p < 0.05$. Based on the result, it can be concluded that the pretest and posttest data are not normally distributed.

Thus, the effectiveness test was done by using Wilcoxon test. The result of the Wilcoxon test is shown in Table 3.

Table 3. The result of effectiveness test of the substantive technical education and training of Islamic Senior High School biology teachers

Based on the Wilcoxon test in Table 3, the result of t calculate was -3.083, while $p = 0.002 < 0.05$ so that it can be concluded that effective substantive technical education and training can improve the mastery of the subject matter of education and training for Islamic Senior High School biology teachers. The education and training materials were the analysis of Graduates' Competency Standards, Core Competencies, Basic Competencies and Biology Indicators of Islamic Senior High Schools, essential material of anatomy and physiology of animals and plants, essential material of cells, animal and plant tissues, essential material of metabolic processes, essential material of biotechnology and their application, essential material of genetic inheritance, the practice of biology learning in Islamic elementary schools. This is in line with Purwoko *et. al.* (2017) who stated that workshops and sustainable assistance activities for teachers can improve knowledge and skills in developing learning scenarios that reflect the scientific method. Levenberg & Patkin (2014) stated that training contributes to the practice of classroom learning. The results of the study were also corroborated by Rahman *et. al.* (2011), Saputro (2012) with the results of his research that teacher training is positively related to effective teaching. Similarly, the research conducted by Rusdin (2017) shows that the development of teacher competencies that have been carried out through education and training in State Junior High School 02 Ligang Bigung Kutai Barat were accumulatively able to increase the skills and expertise of teachers according to their field of work. While Fahrudin & Astini (2018) stated that through training and mentoring on the preparation of parenting programs can improve teacher professionalism. Marlina (2016) stated that the system of professional development of Natural

Sciences teachers should be carried out with an integrated quality management or total quality management (TQM) approach which in practice involves all components of education, with the culture of quality and sustainable improvement process. While Susilawati *et. al.* (2017) shows the results of the research that inquiry-based Natural Sciences teaching materials implemented in tiered inquiry education and training have supported critical questioning and thinking because learning emphasizes the inquiry process facilitated through varied activities.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that: 1) the research findings based on the need analysis through focus group discussions in the education and training center of Ministry of Religion of the Republic of Indonesia showed that: (1) substantive education and training are needed by biology teachers of Islamic Senior High Schools in Central Java and the Special Region of Yogyakarta, (2) the material for the substantive development education and training for Islamic Senior High School biology teachers are the analysis of , the analysis of Graduates' Competency Standards, Core Competencies, Basic Competencies and Biology Indicators of Islamic Senior High Schools, essential material of anatomy and physiology of animals and plants, essential material of cells, animal and plant tissues, essential material of metabolic processes, essential material of biotechnology and their application , essential material of genetic in inheritance, the practice of biology learning in Islamic Senior High Schools, 2) the result of Wilcoxon test of the pretest and posttest in the education and training for biology teachers of Islamic Senior High Schools in Central Java and the Special Region of Yogyakarta in 2018 at the Religion Education and Training Center of Central Java obtained that the result of t calculate was -3,083, while $p = 0.002 < 0.05$ which can be concluded that effective substantive technical education and training can improve mastery of the subject

matter of education and training for biology teachers of Islamic Senior High Schools.

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