

PROCEEDINGS

International Conference

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018

Theme:

**“Revitalization of Technical and Vocational Education to Face
Industrial Revolution 4.0”**

Surabaya, 11-14 July 2018

Speakers:

Prof. Dr. Muhadjir Effendy, MAP.
Minister of Education and Culture, Republic of Indonesia

Michael Freiherr von Ungern – Sternberg
*Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to
Indonesia, ASEAN and Timor-Leste (German)*

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La Trobe University Victoria (Australia)*

Prof. Dr. Muchlas Samani, M.Pd.
Rector of Universitas Negeri Surabaya period 2010-2014 (Indonesia)



Faculty of Engineering
Universitas Negeri Surabaya
2018

PROCEEDINGS

International Conference

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018

Theme:

**“Revitalization of Technical and Vocational Education to Face
Industrial Revolution 4.0”**

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PREFACE

All praises be to Allah SWT, so that the 2018 International Conference of ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*** could be held in Surabaya during 11-14 July 2018. APTEKINDO International Conference is conducted biennially in which this year host is Faculty of Engineering, State University of Surabaya. There were sixteen colleges attending this year Conference, most of which were former Institutes of Teacher's Education (LPTK).

This year theme is *"Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0"* aimed to respond to the development and acceleration of the industrial revolution 4.0 that has become the most discussed issues in many countries. Industrial revolution connects machines with internet systems. In regard to facing such phenomena, Indonesian government through the Ministry of Industry has launched "Making Indonesia 4.0", of which the program focuses on industries that are driving the development of the industrial revolution 4.0 such as food and beverages, electronics, automotive, textiles and chemicals. To achieve better results of the program actualization, vocational education helps to prepare compatible and competitive workers for the areas of the aforementioned industries. Henceforth, numbers of Conferences, conventions, and meetings among Indonesian practitioners in FPTK / FT-JPTK need to be held to initiate ideas in strengthening the role of LPTK within industrial revolution 4.0 era.

The Conference's proceedings contain 121 research papers and ideas that are relevant to the following nine sub-themes: *Technical and Vocational Teacher Competencies, Technical and Vocational Education Curricula, Technical and Vocational Education Models, Technical and Vocational Education Evaluation, Technical and Vocational Education Policy, Public-private Partnership in Technical and Vocational Education, Technical and Vocational Education Management, Technopreneurship, and Competencies Certification.*

Finally, all the committees send their gratitude to the participating speakers and all parties who support the run of the Conference. They also apologize for any inconvenience and wish a better undertaking event next year.

WELCOMING SPEECH RECTOR UNESA

Conference and Convention

Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (Aptekindo) 2018

Rich Palace Hotel Surabaya, 11-14 Juli 2018

Assalamu'alaikum Warahmatullahi Wabarakatuh.

Respectable Head of Universities, members of APTEKINDO

Distinguished Keynote speakers

Honorable authors, and fellow participants of APTEKINDO Conference and Convention 2018

Alhamdulillah, first of all, let us express our gratitude to Allah SWT because of his grace and blessings, we are able to attend this international Conference and convention of the Indonesia Association of Technology and Vocational Education or ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*** held in Surabaya, 11-14 July 2018.

This international and national Conference is conducted biennially as a routine agenda held by Association of Technology and Vocational Education or *Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia* (APTEKINDO), which consists of 16 different universities throughout Indonesia. We would like to thank for the opportunity given to Universitas Negeri Surabaya for hosting this year event.

In the raise of industrial revolution, Conferences, gatherings, and sharing of knowledge play an important meaning in supporting the acceleration of innovative science and technology. Therefore, this Conference's theme is ***"Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0"***. This is an interesting and challenging topic not only for academic researchers but also for stakeholders and industry owners.

Ladies and gentlemen,

Since 2011, the industrial sector has been integrated with the online system known as industrial revolution 4.0. The first industrial revolution was marked by the use of steam engines to replace human and animal power. The second stage of the revolution was marked by the utilization of electrical power and the concept of mass production. Furthermore, the application of automation technology brought the industrial revolution to its third stage. Tremendous revolution happened when information and communication technology was introduced and fully utilized in industrial

area, of which the condition brought the world in the fourth stage of the industrial revolution. The utilization of this technology changed not only the production process, but also across the industrial chains that result in a new digital-based business model which can achieve higher efficiency and better quality in industrial products. The consequences of this revolution are the increase of production efficiency as well as changes in the employment prerequisite. There is an increasing demand for new manpower, whilst the machines are replacing the role of workers. This condition leads to the importance of a new and more advanced method of preparing human resources that are ready to compete in the industrial revolution.

Ladies and gentlemen, in regard to prepare Indonesian human resource in facing the era of media convergence, there are at least two aspects that need our attention, namely the quality of human resources in accordance with the requirement of the digital-based industry and the equal distribution of qualified human resources especially in suburban and urban areas. Both aspects could be meant as a challenge and an opportunity for the higher education especially technology and vocational education to innovate and harmonize curriculum that connects with the industry. Thus, this Conferences becomes a perfect momentum for technology and vocational education to join and strengthen steps in preparing graduates that are ready to compete in the industrial revolution 4.0. Therefore, by starting with ***“Bismillahirrahmanirrahim”*** **The Conference and Convention of Association of Technology and Vocational Education or APTEKINDO 2018, is officially started”**

Ladies and gentlemen, we would like to thank the keynote speakers who are willing to attend and share knowledge in today’s Conference:

1. Prof. Dr. Muhadjir Effendy, MAP.Minister of Education and Culture, Republic of Indonesia
2. Michael Freiherr Von Ungern–Sternberg, ***Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to Indonesia, ASEAN and Timor-Leste.***
3. Prof. Dr. Wenny Rahayu, *La Trobe University Victoria (Australia)*
4. Prof. Dr. Muchlas Samani, M.Pd.,*Rector Universitas Negeri Surabaya (2010-2014).*

We also would like to thank the authors and all participants of the convention who have participated and contributed to sharing the knowledge and ideas. Hopefully, what we share and get here today can give benefits and contribute to improve a competitive atmosphere in Indonesia, Amin YRA.

Surabaya, July 2018

Universitas Negeri Surabaya

Rektor,

Prof. Dr. Warsono, M.S.

WELCOME SPEECH BY THE DEAN OF FACULTY OF ENGINEERING
at the International Conference and National Convention of
Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018
Rich Palace Hotel, 12 July 2018

Assalamu'alaikum Warahmatullahi Wabarakatuh.

His Excellency, Rector of Universitas Negeri Surabaya

Respectable the Head of Universities as the members of APTEKINDO

Distinguished Keynote Speakers

Honorable authors and Participants

Alhamdulillahirobbil alamiin. Thanks God. First of all, let us express our gratitude to Allah SWT because of his grace and blessings we are able to attend the 9th International Conference and convention of ***Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*** and the 19th workshop of the Technology and Vocational Education for FPTK/FT/FTK-JPTK in Indonesia. It is an honor for us, the Faculty of Engineering, Universitas Negeri Surabaya, to host this year Conference and convention.

On behalf of *Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO)*, we would like to welcome keynote speakers, authors, delegates and participants from technology and vocational education to the city of heroes, Surabaya.

Today, we meet in Surabaya to attend a biennial agenda named APTEKINDO International Conference and Convention and National Workshop of the FPTK/FT/FTK-JPTK. Following the mandate from the 2016 APTEKINDO Convention in Medan, this year's Conference is held in Surabaya hosted by the Faculty of Engineering, Universitas Negeri Surabaya.

Ladies and Gentlemen, the theme of this year Conference is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*". The theme is chosen due to the fact that we have to quickly respond and act accordingly to the effects of the industrial revolution on vocational education. Well-programmed and structured efforts should be undertaken to ensure if technology and vocational education can produce globally competitive graduates especially for industrial revolution era.

Numbers of important topics for technology and vocational education are discussed in this Conference. The topics include Technical and Vocational Teacher Competencies, Technical and

Vocational Education Curricula, Technical and Vocational Education Models, Technical and Vocational Education Evaluation, Technical and Vocational Education Policy, Public-private Partnership in Technical and Vocational Education, Technical and Vocational Education Management, Technopreneurship, and Competence Certification.

Today's Conference has several outcomes. The accepted articles will be submitted for proceeding publication indexed by Atlantic Press. Meanwhile, the rejected articles by Atlantic Press will be published in the International Proceedings with International Standard Book Number (ISBN). Moreover, the articles written in Bahasa Indonesia will be published in the National Proceedings with ISBN.

Ladies and Gentleman, this meeting must be meaningful as a venue to communicate among researchers, academics, and members of FPTK / FT / FTK-JPTK from different universities as well as from related industries. By this regular Conference and convention, we can make a strong communication network and create innovative breakthrough and substantial blueprint of different aspects such as institutional quality, field study, and curriculum. We hope that this forum plays an important role in developing technology and vocational education to face the industrial revolution 4.0.

Finally, we would like to thank the organizing committee led by Mr.Tri Wrahatnolo, M.Pd., M.T., who gave an extraordinary support. Moreover, we would like to express our appreciation and gratitude to the members of steering committee from various regions in Indonesia, delegates, SC and OC members, sponsors, as well as personal or institutional support that make this event well-organized. I apologize if there are shortcomings from my part.

Good luck with the Conference of Indonesian Association of Technology and Vocational Education, APTEKINDO 2018, and wish the best improvement for technology and vocational education in Indonesia. Thank you.

Wassalamu'alaikum Warahmatullahi Wabarakatuh

CHAIRMAN'S SPEECH
at the International Conference and National Convention of
Asosiasi Pendidikan Teknologi dan Kejuruan Indonesia (APTEKINDO) 2018
Rich Palace Hotel, 11-14 July 2018

Assalamu'alaikum Warahmatullahi Wabarakatuh.

His Excellency, Rector of Universitas Negeri Surabaya,
Respectable the Head of Universities, members of Aptekindo, Keynote speakers, Authors, and fellow participants of Aptekindo Conference and convention 2018.

Alhamdulillah, no words could represent the feelings but the gratitude of the presence of Allah SWT, for His blessings, so that we can attend APTEKINDO Conference with the theme "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*".

In this pleased occasion, we would like to welcome all keynote speakers, authors, and participants of the Conference to this city of heroes, the city of heroic histories, Surabaya. We would like also to welcome to APTEKINDO 2018 Conference and convention held at the Rich Palace Hotel Surabaya, 11-14 July 2018.

The theme of this year Conference is "*Revitalization of Technical and Vocational Education to Face Industrial Revolution 4.0*". This theme is chosen to respond to the development and acceleration of industrial revolution 4.0 that has been impactful in various countries. This industrial revolution has connected the utilization of machines to an internet system. To face such phenomena, Indonesian government through the Ministry of Industry has launched a program called "Making Indonesia 4.0". Currently, the government is focusing on industries that support the development of the industrial revolution such as food and beverage, electronics industry, automotive, textile and clothing, and chemical industries.

In addition, vocational education plays an important role in preparing competent and competitive human resources. That is, Faculty of Technical and Vocational Education or *Fakultas Pendidikan Teknik dan Kejuruan* (FPTK) in Indonesia aims to compile excellent ideas and vision, which later could

be shared through Conferences, conventions or meetings, and also be useful to encounter industrial revolution 4.0.

Today's Conference will present competent keynote speakers in the field of technology and vocational education, who are:

1. Prof. Dr. Muhadjir Effendy, MAP. Minister of Education and Culture, Republic of Indonesia
2. Michael Freiherr Von Ungern–Sternberg, Extraordinary and Plenipotentiary Ambassador of the Federal Republic of Germany to Indonesia, ASEAN and Timor-Leste.
2. Prof. Dr. Wenny Rahayu, La Trobe University Victoria (Australia)
3. Prof. Dr. Muchlas Samani, M.Pd., Rector of Universitas Negeri Surabaya (2010-2014).

In addition, I would like to point out that there are 602 participants from 17 different universities participating in today's Conference involving:

1. Universitas Palangka Raya
2. Universitas Gorontalo
3. Universitas Islam Negeri Ar Raniry Aceh
4. Universitas Negeri Solo
5. Universitas Negeri Manado
6. Universitas Pendidikan Ganesha
7. Universitas Nusa Cendana
8. Universitas Malang
9. Universitas Negeri Jakarta
10. Universitas Negeri Padang
11. Universitas Negeri Yogyakarta
12. Universitas Pendidikan Indonesia
13. Universitas Negeri Makassar
14. Universitas Negeri Semarang
15. Universitas Negeri Medan
16. Universitas Negeri Surabaya
17. Universitas PGRI Adi Buana Surabaya

There are 491 articles submitted to this Conferences covering papers and posters. 76 articles were accepted to Atlantic Press, 156 articles published in international proceedings with ISBN, dan 129

articles published in the national proceedings with ISBN. All articles will be available for an online access through the Atlantis Press official website and through APTEKINDO 2018 website.

Today's Conference is actually held with the helps and good cooperation of various parties. Therefore, we would like to express our gratitude to the Minister of Research, Technology and Higher Education, Rector of Universitas Negeri Surabaya, keynote speakers, participants, sponsors, and other stakeholders for the supports. We also send our highest appreciation to the committees who have worked hard to succeed this Conference.

At last, we hope that all participants get benefits and knowledge that can contribute to reinforce vocational education and technology in facing the industrial revolution 4.0. WELCOME TO APTEKINDO CONFERENCE AND CONVENTION 2018, Thank you.

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Universitas Negeri Surabaya

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The Influence of Students' Understanding in Conservation Characteristics and Scientific Attitude towards Environmental Care in Universitas Negeri Semarang

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Abstract—The long-term goal of this research is to allow students ready to become the next generation who are healthy, superior, and competitive. Specific objectives of the research are: (1) to describe the level of understanding of the students' conservation characteristic values, (2) to describe the level of students' scientific attitude, (3) to describe the level of students' environmental care, (4) to analyze the influence of understanding the conservation characteristics value and scientific attitude toward environmental care for students of Faculty of Engineering of Universitas Negeri Semarang (UNNES). This research is descriptive and correlational research. The research was conducted at the Engineering Faculty of UNNES. The population was students who have taken Conservation Education course in 2016-2017. The data collection method used documentation and questionnaires, and data analysis used descriptive percentage and multiple regression. The results showed that: the level of understanding of conservation character value of UNNES students on average was more than good; i.e., very good is 30.7%; more than good is 44.3%; good is 25%. The average level of students' scientific attitudes is categorized as good; i.e., good 72.73%; fair 27.27%. The level of student's environmental care is good, i.e., very good is 11.5%, good is 79.5% fair is 9%. The understanding of conservation character value and scientific attitude of UNNES students together have a significant effect of 15.1% on environmental care. Suggestions for all LPTK, in particular, Faculty of Engineering of UNNES is to always improve understanding and inculcate related scientific attitudes through conservation as an effort to increase students' awareness of the environment.

Keywords—conservation characteristics; scientific attitude; environmental care

I. INTRODUCTION

Along with the vision of Universitas Negeri Semarang (UNNES) to become an international conservation university, building character developed by UNNES is implemented through conservation-based character education, which then packed in the name of general course (MKU). The name of conservation becomes attached to UNNES higher education. (Pengembangan Kurikulum UNNES, 2014-2017) Conservation education as a choice of general course name

which characterizes UNNES as a conservation university, must be pursued by all UNNES students. Conservation course aims to build and develop 11 character values, namely: religious, honest, intelligent, fair, responsible, caring, tolerant, democratic, love the motherland, tough, polite. The eleven values of the characters are expected to be inherent in UNNES students, with the intention that students are ready to become the next generation who are healthy, superior, and competitive (Puji Hardati, 2015)

Regarding the vision of UNNES, one of them is to create students into healthy, superior and competitive next generation. Thus, with an understanding of 11 conservation character values, it is expected that all UNNES students have a scientific attitude and high awareness to the environment (Handoyo & Tijan. 2011). According to Abdul Aziz, 2015, scientific attitude is an attitude that accepts the opinions of others well and correctly, who are not familiar with despair, and with perseverance and also open minded; a scientific attitude is an attitude that must be attached to a student when faced with scientific issues, with characteristics such as: curiosity, accuracy, honesty, perseverance, objective, open to accept true and critical opinions. While regarding the concern for the environment, Nenggala, 2007 argues that indicators of someone who cares about the environment are: always take care of the surrounding environment; not taking, cutting or removing the plants along the way; no doodling, not incised writing on the trees, stones, roads or walls; always throw the garbage in its place; not burning garbage around houses; carry out environmental cleansing activities; hoarding used goods; cleaning up the garbage that clogs the drains.

Based on the results of End of Semester Test (Ujian Akhir Semester/UAS) of conservation education course for classes that I taught in the academic year of 2015/2016 and of 2016/2017, the average grade is more than good (A_B); students' scientific attitude also falls into well category. The problem is, related to UAS results, will it have a significant effect on environmental awareness for students? Referring to the purpose of Conservation Education course and also one of UNNES's strategic plan, it is to change the behavior and

attitude of the academic community or community element aiming to increase the knowledge, skill and awareness of students and society about environmental values and issues of environmental issues which ultimately can move campus community and society in general to take an active role in the effort of preservation and environmental safety for the benefit of present and future generations. This research has a close relationship with Renstra Universitas Negeri Semarang, where one of them is "improvement of nation character building". Related to the above description, the issues developed in this research are (1) How is the level of understanding of the conservation character value of Engineering Faculty's students of UNNES?; (2) What is the level of scientific attitude of Engineering Faculty's students of UNNES?; (3) What is the level of environmental awareness of Engineering Faculty's students of UNNES? ; (4) Is there any influence on the level of conservation character value understanding and scientific attitude toward environmental awareness for Engineering Faculty's students of UNNES?

A. Understanding the Value of Conservation Characteristics

Understanding the conservation character value for students is obtained through conservation education materials which generally build and develop 11 character values, namely: religious, honest, intelligent, fair, responsible, caring, tolerant, democratic, love the motherland, tough, polite; and to develop students' scientific attitude. The eleven character values and the building scientific attitude are expected to be inherent in UNNES students, with the intention that students are ready to become the healthy, superior, and competitive next generation. The eleventh values of character and scientific attitudes are as follows:

Religious means, being convinced of the truth of religion or belief in The One Almighty God; implementing the religion according to their beliefs; respecting the difference of religion or belief to God Almighty; having a mandated soul in receiving and performing duties with all its consequences; performing work seriously along with prayer and surrender the results to the Almighty God. Honest is, behaving in accordance with the values and norms of truth in all aspects of life; being dare to defend the truth objectively in accordance with human value and dignity; being dare to say the truth and the uncommon; performing consistent and consequent appointments; being dare to denounce lies and cheats. Intelligent is: thinking logically in accordance with the concept of science; finding the truth logically and methodologically; solving the problems correctly and accurately based on empirical data; being creative in developing new models or ways; finding solutions quickly based on logical thinking. Fair is: behaving according to human value and dignity; behave fairly, harmoniously and consistently in human and environmental relationships; Not being arbitrary and discriminative against others; not discriminating the rights of one person to another; being objective and having good proportional in solving problems. Responsible is: working in accordance with their rights and obligations; working sincerely and genuinely; can bear the trust of others; recognizing his own mistakes or shortcomings; recognizing the strengths of others. Caring is: being sensitive

to other people's difficulties; being sensitive to the physical damage of the environment; being sensitive of various abnormal behavior; being sensitive to the needs and demands of a dynamic society; being sensitive to social life patterns. Tolerant is: recognizing the difference of religion and belief to the God Almighty; recognizing racial, ethnic, gender, social, and cultural differences; putting the interests and rights of others first; considering the feelings of others; helping or providing a hand for other people's difficulties. Democratic is: acknowledging equality of rights; being able to maintain a balance between rights and obligations; prioritizing deliberation for consensus; appreciating differences or diversity; obeying the rules of the game. Love the motherland: being dare to defend the interests of the nation and state; being patriotic and loving the national culture; being dare for the sake of dignity of nation and state; loving the domestic products; maintaining the environment.

Tough: being abstinence in facing difficulties; having a good spirit to achieve optimal work results; not easily being provoked by inaccurate issues; believing in yourself; able to conquer the challenges faced. Polite is: being humble in interpersonal relationships; speaking in good and appropriate language; behaving in accordance with moral values; prioritizing harmony in associating with others; behaving in accordance with the customs of civilized society.

B. Scientific Attitude

According (Baharudin, 1982), it has been a tendency of individuals to act or behave systematically by solving a problem through scientific measures. The students' scientific attitude is the level of the students' attitude toward the learning process. The characteristics of scientific attitudes that should be owned by all academicians, particularly students, are: curiosity, being meticulous, honesty, persistence, objectivity, open to accept correct input, being critical [1]. Curiosity is the beginning or a basis for doing research in order to get something new. By getting accurate data, then the conclusion is also more accurate. Meticulous means to act carefully, and not careless. By being careful in conducting research, it will reduce the errors so as to produce good data. Honesty means, in doing research, a scientist must be honest, which means always accept the reality of the results of his research and not making it up and should not change the data results of his research. Perseverance means not easy to give up. They should not easy to give up when conducting research on a problem. In proving a problem, a research must be repeated to get accurate data. Objective means being in accordance with the existing facts. It means, the research results should not be influenced by personal feelings. Everything that is put forward should be based on the facts obtained. An objective attitude supported by an open attitude means accepting true opinions from others. Open to correct input means that we must not claim ourselves to be the most righteous or the greatest. If there are other opinions that are more right / correct, we must accept it. Critically, it means not directly accepting the conclusion without strong evidence, getting used to using the evidence when drawing conclusions. It is done by searching for as much information as possible, either asking people who are expected to know the problem or by reading before deciding what to

write. For example: When a scientist observes and finds that a bird has a long, pointed beak, then he does not immediately state that all birds has long and pointed beaks before the data adequately support that conclusion. That is the scientific attitude that must be possessed by students, as the healthy, superior, competitive next generation.

C. Environmental Awareness

Environment is everything that is around human that influences the development of human life both directly and indirectly. Community is an element that gets in touch directly with environmental conditions. Then, it is hoped that there is concern for the environment, which operationally includes: throwing garbage in its place, cleaning the house from dirt and dust, cleaning the house regularly, cleaning the gutters regularly, burning the piled up garbage, doing 3 M (closing the water storage, cleaning up the tub routinely, burying unused goods), applying 3B (dispose of garbage in place, clean up all dirty places, get used to clean living).

Environmental concerns can be expressed with supportive or impartial attitudes toward the environment, which can be manifested in a willingness to state actions that can enhance and maintain the quality of the environment in any environment-related behavior. From this sense, it can also be that a person's environmental concern is low if someone is not supportive or impartial to the environment, and a person has high environmental awareness if someone supports or side with the environment. So, it can be concluded that environmental awareness is the degree of focusing attention to a place in which a living grows, which includes essential elements such as land, water and air, which have significance in the life of every living being, in which humans exist and influence the survival as well as human welfare and other living organisms, covering the natural environment, the built or artificial living environment, and the cultural or social living environment.

D. College Students

Student is a term for a person who is studying at a college, which consists of a high school, an academy, and the most common is a university. The students referred in this study are students of Universitas Negeri Semarang (UNNES), both male and female, education year of 2016/2017, who are currently in the second semester; and have taken a course in conservation education.

II. METHOD

Based on the method, this research is a correlational research aiming to develop the most effective working methods (Sugiyono, 2005) [4]. The development gained in this research is expected to develop conservation-based character value education for UNNES students who are expected to contribute in realizing the concept of "students must have 11 conservation character values". According to the level of the explanation, this research is descriptive research. Research location is at the campus of Engineering Faculty of Universitas Negeri Semarang.

The population of this study are all students of Engineering Faculty year of 2016/2017 who have taken course of Conservation Education which is in 14 courses that have 750 students. The 14 programs are: Family Welfare Vocational Education, Culinary Education, Fashion Design Education, Beauty Education, Mechanical Engineering, Automotive, Electrical Engineering, Architecture, Building Engineering, and Chemical Engineering. For more details, the distribution of the population in each study program can be seen in the table below. Research sample is taken randomly and proportional. There are two stages of sampling technique, the first stage determines the sample of the program, of which 50% of 14 Study Program is taken (7 Study Program) with random sampling technique. The second stage determines the sample of students from study sample, each by 20%, with proportional random sampling technique. Determination of research subject is in accordance with the ones allowed by each study program. For more details, sample research can be seen in table 1 below.

TABLE I. RESEARCH SAMPLE IN EACH PROGRAM

No	Program	Number of Students	Number of Sample (20%)
1	Culinary Education	55	11
2	Beauty Education	40	8
3	Mechanical Engineering	43	9
4	Mechanical Engineering Education	84	16
5	Information Technology	89	18
6	Architecture Engineering	40	8
7	Chemical Engineering	89	18
Total		440	88

A. Research Variable

1. The level of conservation character value understanding of the students of Engineering Faculty of UNNES.
2. The level of scientific attitude of students of Engineering Faculty of UNNES.
3. The level of environmental awareness of students of Engineering Faculty of UNNES.

B. Data Collection Technique

This reserach used documents evaluation to measure conservation characters value understanding; questionnaire to measure the level of scientific attitude, and the level of environmental awareness of students of Engineering Faculty of UNNES.

C. Data Analysis Technique

The percentage of descriptive analysis is used to reveal: the level of conservation character value understanding; the level of scientific attitude; and the level of environmental awareness attitude of students of Engineering Faculty of UNNES; Simple regression analysis is used to reveal the influence of conservation character value understanding and scientific attitude toward environmental awareness of students Engineering Faculty of UNNES.

III. RESULTS AND DISCUSSION

A. The Level of Conservation Characteristics Value Understanding

The data on the understanding level of the conservation characteristics value of the students is obtained from the archived documentation of the score of Conservation Education Course that has been taken by students in each Study Program. Based on the collected data, the score of Conservation Education Course from each study program can be seen in the following table 2.

TABLE II. DESCRIPTION OF SCORE OF CONSERVATION COURSE

No	Score	Number	%
1	86 – 100 (Very Good)	27	30.7
2	81 – 85 (More than Good)	39	44.3
3	71 – 80 (Good)	22	25
TOTAL		88	100

Based on the data in Table 2, it shows that the level of understanding of students' conservation character value is good. To give a clearer picture of the table above, please see the Fig.1.

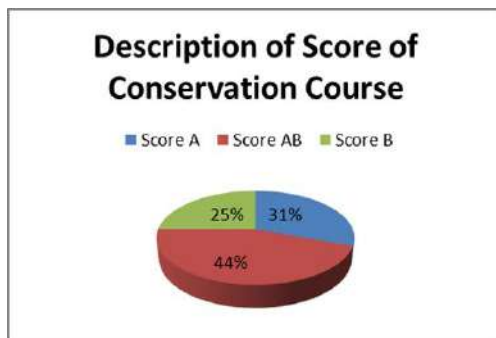


Fig. 1. Description of Score of Conservation Course

B. The Level of Scientific Attitude of Student's Conservation Character

The data of Scientific Attitude of Student's Conservation Character was obtained through a 14-point questionnaire, with 5 alternative answers showing students' scientific attitudes. Based on the answers from the questionnaire, data is obtained as shown in table 3 below.

TABLE III. DESCRIPTION OF LEVEL OF SCIENTIFIC ATTITUDE OF STUDENT'S CONSERVATION CHARACTER

No	Interval	Criteria	Score	%
1	14 – 24	Very Low	0	0
2	25 – 35	Low	0	0
3	36 – 46	Fair	24	27.27
4	47 – 57	Good	64	72.73
5	58 – 70	Very Good	0	0
TOTAL			88	100

The data in the table above shows that there is 72.73% students' scientific character belong to good category, and 27.27% belong to fair category. In average, scientific attitude of students of Engineering Faculty of UNNES is categorized as good. Here is the pie chart presentation in Fig.2.

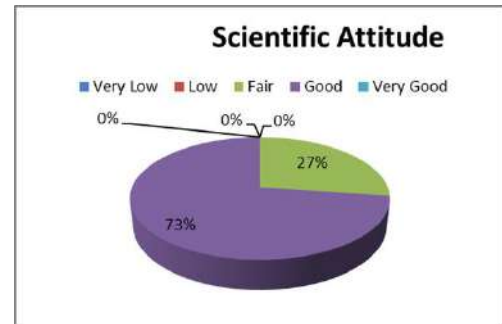


Fig. 2. Level of Scientific Attitude of Student's Conservation Character

C. The Level of Students' Environmental Awareness

The data of Students' Environmental Awareness level was obtained through 14-points questionnaire with 5 alternative answers to know the level of student's awareness to the surrounding environment. Based on students' answers about students' environmental awareness attitudes, the data is shown in the following table 4.

TABLE IV. DESCRIPTION OF LEVEL OF STUDENTS' ENVIRONMENTAL AWARENESS

No	Interval	Criteria	Score	%
1	14 – 24	Very Low	0	0
2	25 – 35	Low	0	0
3	36 – 46	Fair	8	9
4	47 – 57	Good	70	79.5
5	58 – 70	Very Good	10	11.5
TOTAL			88	100

The above table shows that the level of students' awareness of surrounding environment is good by 79.5%, and very good by 11.5%, and fair by 9%. The average level of environmental awareness of Faculty of Engineering -UNNES students is good. It is described in Fig.3 below, in the form of a pie chart.

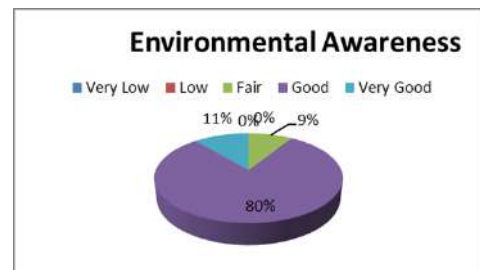


Fig. 3. Level of Students' Environmental Awareness

D. The Influence of Students' Understanding in Conservation Characteristics and Scientific Attitude towards Environmental Care in Universitas Negeri Semarang.

To know the influence of conservation character value understanding and scientific attitude toward the students' environmental awareness, this research used multiple regression analysis with the help of SPSS program. The following result shows the influence of conservation character

value understanding and scientific attitude toward environmental awareness for UNNES students.

1) Multiple Regression Test (Scientific Understanding and Attitude toward Environmental Awareness)

TABLE V. VARIABLES ENTERED/REMOVED

Model	Variables Entered	Variables Removed	Method
1.	Sikap Pemahaman		Enter

a) Dependent Variable : Peduli

b) All requested variables entered

Independent Variable: Understanding and Attitude

Dependent Variable: Awareness.

TABLE VI. MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of The Estimate
1.	.389	.151	.131	3.81958

Determination Coefficient: score R square obtained is 0.151 which means that the influence of variable understanding and attitude toward variable awareness simultaneously is 15.1%.

TABLE VII. COEFFICIENTS

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	15.310	9.878		1550	1.25
Pemahaman	.301	.114	.271	2645	0.10
Sikap	.259	.118	.225	2192	0.31

The variable of Understanding has significance score 0.01 < 0.05 thus there is influence toward variable awareness.

The variable of Attitude has significance score 0.031 < 0.05 thus there is influence toward variable awareness.

TABLE VIII. ANNOVA

Model	Sum Of Squares	Df	Mean Square	F	Sig.
Regression	220.999	2	110.499	7.574	0.01
Residual	1240.081	85	14.589		
Total	1461.080	87			

Conclusion: Variable Understanding of conservation character value and Attitude (independent) both has significance score 0.001 < 0.05 thus there is influence toward variable Environmental Awareness (dependent).

Based on the table of multiple regression analysis above, it shows that the determination coefficient of the obtained R score value is 0.151. This implies that the influence of variable conservation character value understanding and scientific

attitudes to variable student's environmental care simultaneously is 15.1%.

E. Discussion of Research Result

The findings of this study indicate that the understanding of Conservation Character Value of Faculty of Engineering students in average is very good. This can be seen from the value obtained by the students when attending Conservation education course that on average is more than good (A/B). This condition is very encouraging for the Faculty of Engineering program in particular and Universitas Negeri Semarang in general. The value of Conservation Education Course of Faculty of Engineering students in average is very good. It is predicted because: (1) the lecturers of the course are experienced. Lecturers who teach Conservation Education course in general are permanent lecturers in the sense they continuously teach education courses every year. (2) Every student taking the Conservation Education course gets a smart book along with tasks for one semester, which must be done by them, (3) During lecturing, most students make paper on matters related to conservation, (4) Lectures have more discussion than speech, (5) In every semester, lectures are expected to have 16 times meetings. With these lecture conditions, it make it easier for students to understand the subject matter of Conservation Education.

The results of this study found that the Scientific Attitude of Faculty of Engineering students in average was good. A person's scientific attitude on something (conservation), is generally strongly influenced by the person's understanding of conservation issues. If students' understanding of conservation is well, their Scientific Attitudes towards conservation is expected to also be good. In this study, it was found that in average, the score of Student's Conservation Education is considered more than good. It might have very big influence on the students' scientific attitude, which means that if the score of Conservation Education is more than good, the students' understanding on conservation is also good, which finally means that the students' scientific attitude about conservation is also good. In addition, it is found that the scientific attitude of Faculty of Engineering students is good, which it is assumed that students' activities conducted by majors, faculties and universities are always associated with conservation. This will add students' understanding of conservation. With the increasing of students' understanding about conservation, it will improve the scientific attitude towards conservation on campus. Therefore, it is natural that in this research, scientific attitude of students about conservation is considered good.

In this study, it was also found that the students' awareness of the environment is good. This condition is very prideful for the Faculty of Engineering program in particular and UNNES in general, because it means students have a good level of environmental awareness. The results of data analysis using Multiple Regression showed that the level of students' environmental awareness is influenced by both the level of conservation character value understanding and student's scientific attitude. The influence of these two variables, which are the Level of Conservation Character Value Understanding

and Students' Scientific Attitudes, is 15.1% and the influence is significant. If noticed, the effect of these two variables is relatively small, which is only 15.1%, while the 84.9% is determined by other un-examined factors. However, the students' level of awareness is good, this may be due to UNNES program activities that are always associated with environmental awareness programs. Students, since they enrolled in UNNES, have been introduced to what is conservation. For example, they have to carry and plant trees, which the program is known as SUSU (Sak Uwong Sak Uwit) or One Man One Tree, socialization about riding bicycle on campus, paperless policy, energy-efficient, rule on not allowed to burn garbage, etc, which all covered in the Seven Conservation Guard of UNNES. With the existence of such activities and invitations that are environmentally sustainable, it is logical if students have a good level of environmental awareness.

IV. CONCLUSION

1. The level of conservation character value understanding of students of Faculty of Engineering of UNNES is very good by 30.7%, more than good by 49.3% and Good by 25%.
2. The level of Scientific Attitude of students of Faculty of Engineering of UNNES is categorized as Good by 72.73%, and Fair by 27.27%.
3. The level of Environmental Awareness of students of Faculty of Engineering of UNNES shows that the level of environmental awareness is very good by 11.5%, Good by 79.5% and Fair by 9 %.
4. There is a simultaneous significant influence between the conservation character value understanding and scientific attitudes towards the students' environmental care, which is 15.1%.

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CERTIFICATE

This is to certify that

ASIH KUSWARDINAH

has participated as

PRESENTER

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Surabaya, 14th July 2018

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