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TABEL: AKTIVITAS KORENPONDENSI PUSLIKASI ARIKEL Kode Submission: 20200123042521, NO. 050220, JUDUL 'The Learning Strategy Based on Scientific Approach to Strengthen the Employability Skill of Teacher Candidates' Pada International Journal of Instruction (IJI)

No	Tanggal	Aktivitas		No. Lampiran	Data lampiran	Halaman
		Authours	Internatiaonal Journal of Instruction			
1.	03 Januari 2020	Submit artikel, kode submission: 20200123042521	-	Lamp. 1	Pengantar submit artikel pada IJI	1
				Lamp. 2	Artikel yang disubmit	2-15
2.	19 Januari 2020	-	Keputusan editorial artikel ditolak, karena penulisan tidak sesuai format/templet IJI	Lamp. 3	Keputusan IJI bahwa artikel ditolak, atau perbaiki penulisan sesuai teknik penulisan IJI	16

3.	20 Januari 2020	Penulis menjawab, akan memperbaiki naskah sesuai pedoman penulisan	-	Lamp. 4	Penulis membalas email IJI tertanggal 19 Januari, bahwa penulis akan memperbaiki artikel untuk disesuaikan dengan tempet IJI	17
4.	23 Janurai 2020	Submit ulang	-	Lamp. 5	Submit ulang artikel yang sudah disesuaikan dengan tempet IJI, dan mendapat balasan ini pada tanggal 23 Januari 2020.	18
				Lamp. 6	Artikel 23 Januari 2020	19-33
5.	12 Februari 2020	-	Artikel memenuhi, syarat dan akan dikirim reviuwer untuk dievaluasi, kesediaan membayar 900900 HCF	Lamp. 7	Email IJI tentang kesediaan penulis membayar 900 HCF saat artikel akan diterbitkan.	34-36
6.	3 April 2020	-	IJI mengirim hasil evaluasi dari 3 evaluator dan daftar isian hasil perbaikan	Lamp. 8	Email IJI mengirim hasil evaluasi artikel ke penulis.	37
				Lamp. 9	Hasil evaluasi artikel dari evaluator 1	38-39
				Lamp. 10	Hasil evaluasi artikel dari evaluator 2	40-41
				Lamp. 11	Hasil evaluasi artikel dari evaluator 3	42-43
				Lamp. 12	Daftar hasil revisi	44
7.	3 April 2020	Penulis membalas untuk merevisi artikel	-	Lamp. 13	Submit hasil refisi tanggal 3 April 2020	45

				Lamp. 14	Draf artikel hasil refisi	46-62
8.	5 April 2020	Mengirim hasil perbaikan-ke 1 /refisi tanggal 3 April 2020	-	Lamp. 15	Balasan iji bahwa artikel sudah diterima dan akan kirim ke evaluator.	63
9.	24 April 2020		IJI sudah menerima hasil evaluasi evaluator, di dikirim ke penulis untuk dapat diperbaiki kembali (revisi ke-2)	Lamp. 16	Isi Email	64
				Lamp. 17	Lembar hasil evaluator artikel (Email 24 April 2020)	65-66
				Lamp. 18	Daftar perubahan/revisi draf artikel (email 24 April 2020)	67
10.	25 April	Penulis menyampaikan kesediaan perbaikan artikel		Lamp. 19	Jawaban kesediaan memperbaiki artikel, dan mengirim hasil perbaikian artikel dari penulis ke IJI.	68
11.	26 April 2020	Penulis mengirim hasil revisi ke-2.		Lamp. 20	Email penulis ke IJI tanggal 26 April 2020	69
				Lamp. 21	Isian form hasil refisi pada artikel ke -2	70
				Lamp. 22	Draf article hasil refisi	71-88
12.	26 April 2020		Iji menjawab email bahwa hasil refisi sudah iji terima Dan akan diteruskan ke evaluator	Lamp. 23	Email iji tanggal 26 April 2020, bahwa hasi revisi draf sudah diteriama dan akan diteruskan ke evaluator	89
13.	10 Mei 2020		Iji mengirim hasil valuasi dari evaluator untuk	Lamp. 24	Iji mengirim hasil evaluasi artikel dari evaluator	90

			perbaikain artikel ke-3	Lamp. 25	Hasil evaluasi ke-3 dari evaluator IJI	91-92
				Lamp. 26	Naskah yang perlu diperbaiki	93-109
14.	18 Mei 2020	Penulis, merespon email dari iji, bahwa penulis akan perbaiki artikel		Lamp. 27	Enail 18 mei 2020	110
15.	18 Mei 2020	Mengirim hasil refisi ke-3 ke IJI		Lamp. 28	Draf artikel hasil revisi	111-128
16.	21 Mei 2020		Pemberitahuan dari IJI tentang penerimaan naskah hasil refisi ke-3 dan akan dikonfirmasi dengan evaluator	Lamp. 29	IJI mengirim email ke penulis bahwa editorial IJI telah menerima artikel hasil revisi, dan akan mengkonfirmasi ke evaluator	129
17.	01 September 2021		Iji mengirim pesan email, bahwa artikel No. 050220 dinyatakan lengkap, dan sudah accepted untuk publkasi pada April 2021	Lamp. 30	Artikel lengkap dan aceepted	130
18.	1 September 2020	Penulis menyampaikan permohonan kepada iji untuk bisa diterbitkan periode oktober 2020		Lamp. 31	Permohnan ke IJI supaya artikel bisa diterbitkan bulan Oktober 2020	131
19.	2 September 2020		Jawaban iji: 1. Jadwal penerbitan artikle tidak bisa dimajukan, karena sesuai urutan	Lamp. 32	IJI menjawab permohonan email tgl 01 September 2020, Bahwa keputusan IJI tidak bisa diubah, karena keputusan yang	132

					diambil adalah sudah sesuai dengan mekanisme jurnal	
20.	7 Februari 2021		Artikel terbit di OnlineFirst	Lamp. 33	Penyampaian artikel yang akan diterbitkan dari iji ke penulis	133
21.	7 Februari 2021	Permohonan editing ke iji Untuk kesalahan penulisan dan terjemahan		Lamp. 34	Permohonan kepada iji untuk perbaikan kesalahan penulisan, dan kata	134-135
22.	8 Februari 2021		Balasan dari iji tentang kesediaan memperbaiki kesalahan penulisan kata/ penerjemahan	Lamp. 35	IJI akan memperbaiki isi permohanan untuk perbaikan kesalahan redaksi penulisan	136
23.	08 Februari 2021		Artikel terbit di Online first dan sudah memenuhi permohonan perbaikan	Lamp. 36	Artikel terbit di Online first, dan Tanggal 1 April 2021 Artikel Publish	137-156
24.	01 April 2021		Artikel Publis pada April 2021, Vol. 14 No. 2	Lamp. 36	Artikel terbit di Online first, dan Tanggal 1 April 2021 Artikel Publish	137-156

Semarang, 23 Maret 2021

Yang menyatakan,

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Lampirar 1. Submit artikel pada IJI

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e-iji.net'ten Makale gönderildi

1 message

e-iji.net <info@e-iji.net> Fri, Jan 3, 2020 at 3:08 PM
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Lampiran 2: Artikel yang disubmit

THE LEARNING STRATEGY BASED ON SCIENTIFIC APPROACH TO STRENGTHEN THE EMPLOYABILITY SKILL OF VOCATIONAL SCHOOL TEACHER CANDIDATES

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ABSTRACT

The preparation of Vocational School teacher candidates who have technical skills and employability skills begins with the learning process. This paper aims to formulate learning strategies based on scientific approach to strengthen employability skills for vocational school teacher candidates. This study employed a quantitative approach with a non-experimental survey design. The samples in the study consisted of 120 vocational teacher candidates in the Automotive Engineering Education Program, Faculty of Engineering, Universitas Negeri Semarang (UNNES) who took car body's electrical system practicum course. Research data were collected with test questions, observation sheets and questionnaires. The research data were analyzed using descriptive analysis, regression analysis. Data analysis was performed with the help of SPSS software version 20.0 for windows. The results showed that the implementation of learning strategies with scientific approach significantly strengthen employability skills of vocational teacher candidates with a contribution of 22.0%, while the remaining 78% was influenced by other factors.

Keywords: learning strategies - scientific approach - employability skills - vocational school - teacher candidates

Introduction

Vocational Education and Technology Institutions (VETIs) are educational institutions with the same level of university which are responsible for educating teacher candidates. Automotive Engineering Education Program at the Faculty of Engineering, Universitas Negeri Semarang is a VETI that produces vocational school teacher candidates in the expertise of Automotive Engineering. Professors, lecturers, and education staffs are expected to conduct a learning process that is responsive to social roles and changes in job skills in the workplace so learners can succeed in the workplace (Hounsell, 2011).

The challenge of VETIs graduates is that the workplace demands graduates with high competition (High Fliers, 2018), VETI is challenged to create outstanding graduates who are best suited for work, innovative, creative (Walker, 2018). The industrial era 4.0 has induced changes in occupational skills at the workplace (Hamill, 2018). The impact of changes at the workplace in the industrial era 4.0 led to several changes in VETI so that the graduates remain relevant according to market needs and are ready to work. There are 10 top skills required in 2020 (Gray, 2016). Furthermore, Wagner emphasized that in entering the "occupational world" in the 21st century, seven survival skills are required: *(*1) critical thinking and problem solving; (2) collaboration across networks and leading by influence;(3) agility and adaptability; (4) initiatives and entrepreneurship; (5) effective oral and written communication; (6)

accessing and analyzing information; and (7) curiosity and imagination (Wagner, 2008). Performance of professors, lecturers, and education staffs are influential in producing competencies and the formation of character, mentality and mindset of students (Lapsley and Ryan, 2016). The learning process is expected to develop exceptional human resources, skilled and have high skill (Orlich et al., 2013).

In Indonesia, the Ministry of Research, Technology and Higher Education (Ristekdikti) pays serious attention to VETIs to be able to produce competent teachers with good character and have high employability skills. However, the weak employability skills from VETI graduates who work as teachers both in public schools and in vocational schools, and working in the industry are often highlighted (Lim et al., 2016; Raza and Naqvi, 2011). The graduates of secondary vocational schools, diplomas and higher education are still less competent in terms of: (1) oral and written communication, (2) critical thinking and problem solving, (3) work ethics and professionalism, (4) working in teams and collaborating, (5) working in different groups, (6) using technology, and (7) project management and leadership (Trilling and Fadel, 2009). Those seven components are based on the study of Trilling and Fadel (2009). They are basic skills that every teacher candidates are required to adapt to the workplace.

The employability gap is observed by studies in various parts of the world, including Australia (Evans-Greenwood, et al., 2015); India (Rao, 2014); United States (Lawrence, 2002); England (Dickinson, 2000) and (Smith and Edwards 2016); Malaysia (Singh and Singh, 2008); Uzbekistan (Ajwad et. al., 2014) and Pakistan (Mirzaa et al., 2017), (Raza and Naqvi, 2011); Rao (2014) found that a major problem in India is the employability skills of labor. In Australia, 22.4% of health entrepreneurs face difficulties in recruiting graduates with the appropriate skills (Messum et al., 2015). A total of 64% engineering entrepreneurs in India stated that they are only 'somewhat satisfied' with the recruitment of new workers (Messum et al. 2015; Blom and Saeki, 2011). In Uzbekistan, entrepreneurs reported problems in recruiting employees with the appropriate number of skills reaching only 73% (Ajwad et al., 2014).

Based on these reviews, the efforts to reinforce the employability skills for students as teacher candidates start from the reinforcement of vocational institutions graduates. Especially if it is associated with VETIs as institutions which produce vocational school teachers, the position of employability skills is increasingly strategic to be reinforced in the learning process in VETIs.

This paper aims to formulate a learning strategy with a scientific approach to strengthen employability skills of the vocational teacher candidates. Although, it is recognized that competencies and skills are complex and challenging to learn, the vocational teacher candidates find it difficult to develop employability skills unless they are explicitly taught. Complex competencies and skills must be developed integrated with learning and not with individual learning (Hadromi, 2018)

Employability skills

Employability skills are main skills, soft skills, generic skills, main competencies, transferable skills or personal attributes (Messum et al., 2015; Jackson, 2012). Employability skills as skills which are required not only to get a job, but also for the progress of the company and the workforce can contribute well for the company (Messum, et al., 2015). Employability skills are general and non-technical competencies required to do all types of work (Ju et al., 2011).

According to the results of a study by the American Institutes for Research (2016), employability skills that can be taught through education and workforce development systems, are divided into three broad categories; (1) Effective Relationship, the interpersonal skills and personal qualities that enable individuals to interact effectively with clients, coworkers, and supervisors; (2). Workplace Skills, the analytical and organizational skills and understanding required by employees to successfully perform work tasks; (3). Applied Knowledge, the integration of academic knowledge and wise technical skills, put to practical use in the workplace, is detailed in table 1.

Employability skills have three main parameters, namely: 1) basic skills: communication skills, information management skills, problem solving skills; 2) self-management skills: skills in demonstrating positive attitudes and behavior, responsible skills, adaptive skills, continuous learning skills, safe work skills; and 3) teamwork skills: skills in working with others in the team, skills in participating in a project or task (Sudjimat, 2013).

The core of the learning approach based on scientific method

The Scientific Method is a series of processes for answering questions (Proyogi, 2018). Through the thought process, the hypothesis is proposed to be a temporary answer to the question, which has been posed. The scientific method as a scientific process consists of six steps: (1) posing the problem, (2) formulating hypotheses, (3) designing an experiment, (4) making observation, (5) collecting data from the experiment, and (6) drawing conclusions (Proyogi, 2018). Scientific Method is a method to generate and answer scientific questions through observation and or experimentation.

Professors, lecturers, and educational staff of vocational subjects must be able to design learning process that can develop cognitive skills, technical skills, and soft skills in the form of employability skills simultaneously. Preparation of vocational school students who have academic skills, technical skills and employability skills stems from the education process of vocational school teacher candidates (Hadromi, 2018), A study conducted by [Prayogi et al., 2018)] showed that the learning process carried out by vocational teacher education institutions emphasizes on the increasingly strong employability skills of vocational teacher candidates.

Table 1. Components of employability skills

Skill	Code	Criteria	Including
Effective Relation - ships (K1)	K1-1	Interpersonal skills; enable employees to collaborate as team members or work independently, as appropriate, and contribute to the overall goals of the workplace	Understand teamwork and work with others; respond to customers' needs; leadership training; negotiations to resolve conflicts; respecting individual differences.
	K1-2	Personal quality which includes a set of behaviors and skills that enable employees to establish effective relationships and functions appropriately in the workplace	Demonstrating responsibility and self-discipline; adapt and show flexibility; work independently; demonstrating a desire to learn; demonstrating integrity; demonstrate professionalism; take the initiative; display a positive attitude and sense of self-worth; assume responsibility for professional growth.
Workplace Skills (K2)	K2-1	Resource management; enable employees to carry out work tasks successfully by managing time and other resources	Time management: manage money; managing ingredients; arrange personnel.
	K2-2	The use of information; enable employees to carry out work tasks successfully by understanding, evaluating, and using various information.	Placing information: organize information; use information; analyze information; communicating information.
	K2-3	Communication skills: enables employees to carry out work tasks successfully by communicating effectively with others in various formats.	Communicate verbally: active listening; understand written material; convey information in writing; observe closely.
	K2-4	Systems thinking; enable employees to perform work tasks successfully by understanding the relationships between system components.	Understand and use the system; monitor the System; improve the system
	K2-5	Use of technology; enable employees to carry out work tasks successfully applying information technology appropriately and effectively.	Skills in using various technologies
Applied Knowledge (K3)	K3-1	Applied Academic Skills; enable employees to place skills based on academic discipline and learning such as reading, writing, mathematical strategies and procedures, as well as scientific principles and procedures for practical use in the workplace.	Using reading skills; use writing skills; use mathematical strategies and procedures; using scientific principles and procedures.
	K3-2	Critical thinking skills; enable employees to think critically and creatively in the context of their work, solve work-based problems, and make good decisions at work.	Critical thinking; creative thinking; make good decisions; solve the problem; reason; plan and organize.

(Adopted from: American Institutes for Research. 2016)

The core of learning Scientific Method aims to gain scientific knowledge systematically. The scientific approach is rooted in the scientific method, a concept that emphasizes the process of gaining scientific knowledge. Scientific

methods are procedures or processes that prioritize more active and participatory methods (Simonneaux, 2014; Baar, 2011; Reid, 2008). This kind of learning strategy can support students to develop hands-on and mind-on (Duda, 2010), and develop students' basic abilities such as communication, interpersonal relationships, critical thinking, and problem solving skills (Lazanyi, 2012). This was confirmed by Kumar (2013) and Prain (2012) who argued that to compete in the 21st century, the young generation must at least have the following abilities; communication skills, interpersonal relationships, critical and rational thinking, problem solving, risk taking, cooperative skills, innovative skills, leadership, and technology.

Scientific method learning strategies

The application of a scientific approach to learning is basically guided by the characteristics of the scientific approach that is transformed in the steps of learning process. Steps in applying the scientific approach according to Ryan and O'Callaghan (2018) include five steps as follows. STEP 1: Make an OBSERVATION - gather and assimilate information about an event, phenomenon, process, or exception to a previous observation, etc. STEP 2: Define the PROBLEM - ask questions about the observation that are relevant and testable. Define the null hypothesis to provide unbiased results. STEP 3: Form the HYPOTHESIS - create an explanation, or educated guess, for the observation that is testable and falsifiable. STEP 4: Conduct the EXPERIMENT - devise and perform an experiment to test the hypothesis. STEP 5: Derive a THEORY - create a statement based on the outcome of the experiment that explains the observation (s) and predicts the likelihood of future observations.

In line with Ryan and O'Callaghan (2018), the Minister of Education and Culture Regulation Number 22 Year 2016 states that learning steps with a scientific approach include observing, asking, experimenting, reasoning (associating), concluding, and communicating (forming networks). These five steps are known as 5M. The scientific approach is included in the student-centered approach, because in the process, it prioritizes active students in the learning process and the teacher acts as a facilitator.

In the learning process based on a scientific approach, the domain of attitude observes the transformation of learning substance or teaching material so that students "know why." The realm of skill is observing the transformation of learning substance or teaching material so that students "know how". The realm of knowledge observes the transformation of learning substance or teaching material so that students "know what." The result is an increase and balance between the ability to be good human beings (soft skills) and people who have the skills and knowledge to live properly (hard skills) from students who includes aspects of competence, attitudes, skills, and knowledge.

Research methodology

Research design

This study employed a quantitative approach with a non-experimental survey because the study investigated sample data obtained from the population and used a questionnaire as a data collection instrument (Sund & Leslie 1973). The study aims to determine (1) the characteristics of the scientific approach implementation and employability skills variables, (2) confirm whether the indicators of the scientific approach implementation influence the reinforcement of employability skills, and (3) determine the contribution of the scientific approach implementation to reinforcing employability skills. The implementation of the scientific approach as an independent variable, and employability skills as a dependent variable.

Population and samples.

The research population consisted of 450 students of Automotive Engineering Education Program, Mechanical Engineering Department, Faculty of Engineering, Universitas Negeri Semarang. Furthermore, the sample of this study was determined using a purposive sampling technique (Gunawan, 2015). Sampling was based on on consideration by involving the third semester students and the students who joined program car electrical system course, and AC systems with a total of 120 students.

Research instrument

The research instrument consisted of (1) scientific approaching learning instruments, (2). The instrument for the employability skills reinforcement of vocational school teacher candidates. The instruments used in learning activities have scientific approaches consisting of syllabus, lesson plans, practicum sheets . The instrument was

validated by two vocational education experts and two education practitioners (the lecturers of Automotive Engineering Education Program). Validation was performed by giving scores for each component on the validation sheet with a score range of 1 - 4. Score 1 indicates "invalid," 2 indicates "somewhat valid," 3 indicates "valid," and 4 indicates "highly valid." Data analysis from the results of validation was conducted by calculating the average score from experts and practitioners. Validation results showed the following scores: 3, 62 (valid) for syllabus, 3.68 (valid) for lesson plans, 3.70 (valid) for job sheets. Furthermore, the instrument for the scientific approach implementation and employability skills reinforcement consists of 30 questions each. The instruments were validated by using SPSS version 20.0 for windows. The value of Person Correlation for each instrument was between 0.438 to 0.519, and 0.410 to 0, 547 with valid category.

Reliability tests were also conducted on instruments to measure scientific approach implementation, and employability skills reinforcement. Reliability testing involved 54 students who were asked to complete 30 questions that had previously been validated. A score of 54 students was then tested using Cronbach's alpha with the help of Statistical Package for Social Sciences (SPSS) version 20.0 for Windows. Reliability test showed that the Cronbach's alpha value for the scientific approach implementation was 0.747, and 0,791 for the employability skills reinforcement. Both values were greater than 0.6. Therefore, both instruments were considered reliable. Both instruments for scientific approach implementation and employability skills reinforcement were valid and reliable to be used to collect research data

Data analysis

Data in this study were tested for their for homogeneity, normality and linearity before they were analyzed using descriptive analysis, regression analysis. The data analysis of the data was performed with the help of SPSS version 20.0 for Windows. The application of descriptive analysis was conducted to determine the variable characteristics of the scientific approach implementation and employability skills reinforcement. The regression analysis was used to determine the influence and contribution of the scientific approach implementation to employability skills reinforcement.

Prerequisite test

The prerequisite test which was performed before regression analysis consisted of homogeneity test, normality test, and linearity test. The data homogeneity test results with α: 0 , 5 with numerator df (n-1, where n = 120), and denominator df (n-1, with n equal to 120) showed F stat: 1.146, and F table : 1.35 . Because F count < F table, then the data had the same variance (homogeneous).

Table 2 Normality test.

	Kolmogorov-Smirnov [a]			Shapiro-Wilk		
	sTatistic	df	sig	Statistics	df	sig
Unstandardized Residual	.057	120	.200 *	.98	120	.287

Note: * . This is the lower bound of the true significance

a. Liliefors Significance Correction

The results of normality test data using Kolmogorov-Smirnov showed the Sig. Kolmogorov Smirnov = 0.200>α = 0.05, the conclusion is that the data on scientific approach implementation and employability skills are normally distributed (table 2).

The linearity test results showed the F value was fit (Deviation from linearity is 1.145 with significance 0.311 above 0.05) so that linearity requirements were met. (table 3).

Table 3 Linearity test

			Sum of Squares	df	Mean Square	F	Sig.
Strengthening Scientific Employabiliti skills * Learning approach	Between Groups	(Combined)	1621,360	27	60,050	2,427	.001
		Linearity	884,616	1	884,616	35,748	.000
		Deviation from Linearity	736,745	26	28,336	1,145	.311
	Within Groups		2276,631	92	24,746		
	Total		3897,992	119			

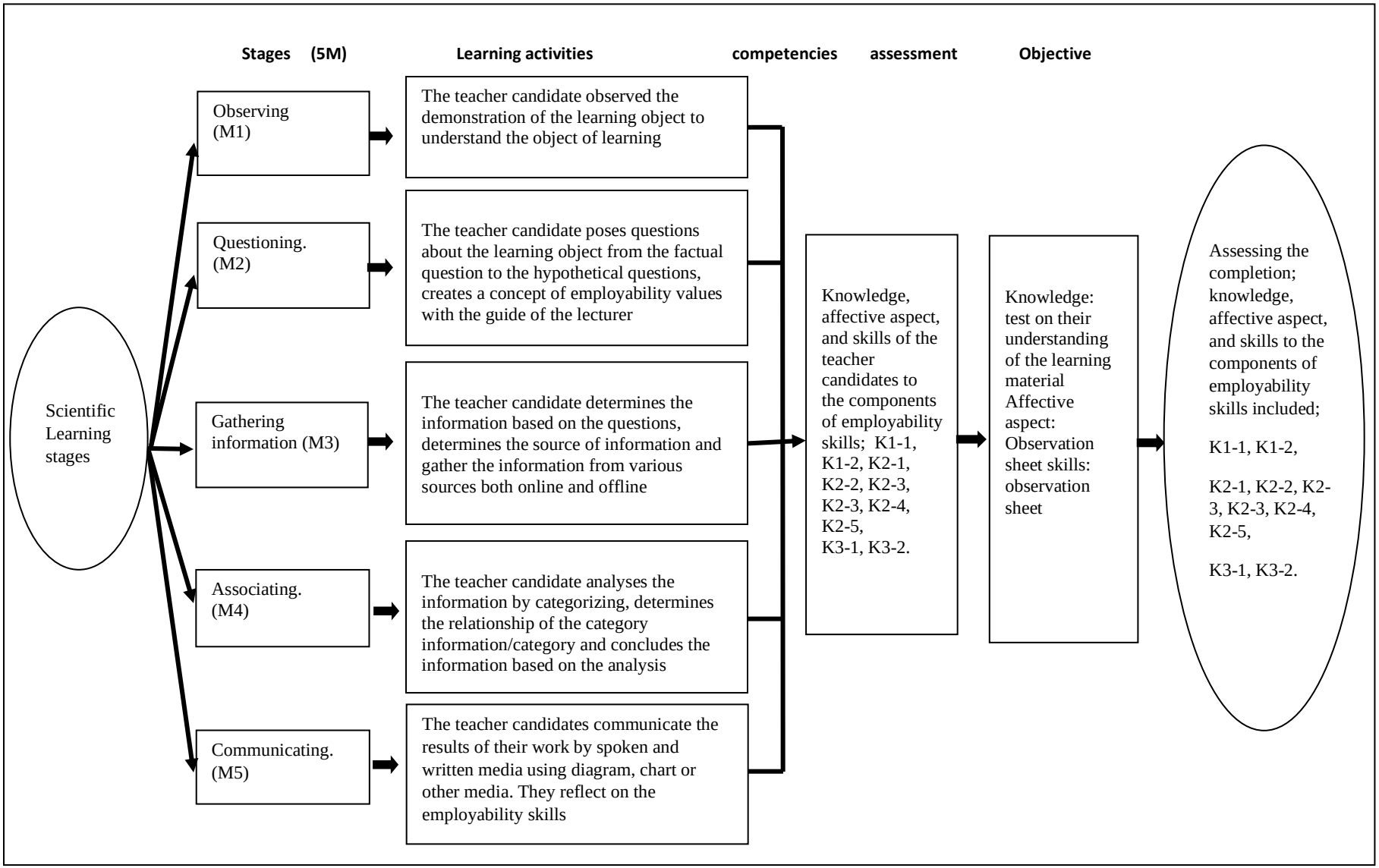

Figure 1 the stages of the implementation of learning process with a scientific approach

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Stages Of Learning With Scientific Approach

Planning

The planning stage of learning process with employability skills reinforcement for vocational school teacher candidates was conducted in the following steps;

1. The lecturer prepared the learning documents; semester learning plan (RPS); teaching materials, learning media.
2. The lecturer chose a car body's electrical system practicum course that was used in conducting research.
3. Vocational teachers and prospective teachers understood the curriculum that strengthens the mutually agreed employability skills of vocational teacher candidates .
4. The vocational school teacher candidate understood the competencies that was applied in learning according to the content of the Automotive Engineering Education Study Program's Curriculum.
5. In this context attitude / affective indicators are taken from the formulation of *employability skills* that already exist in the curriculum consisting of *Effective Relationships* (K1) , *Workplace Skills* (K2) , and *Applied Knowledge* (K3)
6. The selection of the value of employability skills to be developed in vocational school teacher candidates is used as a basis for determining learning and assessment activities.
7. Prepared the assessments; test questions, questionnaires, and observation sheets.

Implementation

The learning process which used the scientific method was carried out in three stages: (1) preliminary activities; (2) core learning activities; and (3) closing activities. Preliminary activities were carried out by giving orientation to vocational school teacher candidates about the learning material to be delivered, it was continued to provide motivation, apperception, giving references.

The core learning activities were carried out according to the steps of the scientific approach including observing, questioning, experimenting, reasoning (associating), concluding, and communicating (5M) (Utanto et al. 2017; Gunawan et all, 2017) . 5M was applied using ICT-based media and applied the learning technique / method based on students' activities that are fully illustrated in Figure 1.

Closing activities were carried out by (1) making a summary / conclusion of the lesson by involving the teacher candidate; (2) checking the completion of the tasks; (3) providing feedback and direction / motivation; (4) Delivering follow-up on learning and remedial/enrichment services; (5) Informing the material / tasks of the next meeting; (6) closing the lesson with greetings

Result

The Description of Scientific Approach Implementation Data

The data on the implementation of scientific approach were revealed by questionnaire consisting of 30 items in the four scale (1 - 4). A minimum score for the scientific approach implementation variable was equal to 30, the amount of the maximum score was 120, and the mean criterion $(\bar{X}\,k)$ was 75. The results of the research data showed that the minimum score was 74, the maximum score was 108, the mean score was 92.26, the median score was 92, the mode was 95, and the standard deviation was 6.15. By using the mean score of the criteria ($\bar{X}k = 75$), the classification of the number of scores can be arranged in five categories as seen in Table 4.

Table 4 Classification criteria for scientific approach learning strategy implementation

No.	Category	Interval	Frequency	Percentage
1.	Very low	30, 0 < Score ≤ 51.0	0	0
2.	Low	51.0 < Score ≤ 67.5	0	0
3.	Moderate	67.5 < Score ≤ 82.5	8	6.67
4.	High	82.5 < Score ≤ 97.5	89	74,17
5.	Very High	97.5 < Score ≤ 120	23	19.16
Total			120	100

The mean score of the research data was 92.56 ($\bar{X}$= 92.56). By using the classification criteria in Table 5, in general, all students in Automotive Engineering Education Department, Faculty of Engineering, Universitas Negeri Semarang

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perceived the implementation of scientific approach in electrical and air conditioning systems were categorized as very high. Only 6.67 % of students perceived the implementation of the scientific approach in the moderate category, 74.17 % in the high category, 19.16 % in the very high category.

Description of Employability Skills Reinforcement Data

The variable on employability skills reinforcement of the teacher candidates at vocational school was revealed by the questionnaire. The questionnaire consisted of 30 items in a scale of four (4). The minimum score was 30, the maximum score was 120. Therefore, the mean criteria ($\bar{X}k$) was 75. The results of the research data showed that the minimum score of the employability skills reinforcement was 68, the maximum score was 101, mean score was 90.49 , median score was 92.0, mode was 95, and the standard deviation was 5.71. Then by using the criteria of the mean score ($\bar{k}$ = 60), the scores on the variables of the employability skills reinforcement can be classified in five categories. (table 5).

Table 5 Criteria for classification of the variables of the employability skills

No.	Category	Interval	Frequency	Percentage
1.	Very low	30,0 < Score ≤ 51.0	0	0
2.	Low	51.0 < Score ≤ 67.5	1	0.83
3.	moderate	67.5 < Score ≤ 82.5	8	6 , 67
4.	High	82.5 < Score ≤ 97.5	88	73,33
5.	Very High	97.5 < Score ≤ 120	23	19,17
Total			120	100

The mean score of the study ($\bar{X}$ = 90.49) with the criteria for classification can be seen on table 5. The percentage of employability skills of students as the vocational teacher candidates in Automotive Engineering Education which were categorized as low was 0.83, the moderate category was 6, 67%, higher category was 73.33%, and 19.17% was on the very high category.

If it is classified, the data for strengthening employability skills for prospective vocational teachers in each component, i.e. (1) *Effective Relationships* (K1), (2) *Workplace Skills* (K2), dan (3) *Applied Knowledge* (K3) ditabulasikan dalam tabel 6 sebagai berikut,

Table 6. Data on strengthening of vocational teacher candidtes' employability skills

Komponen	*Effective Relationships* (K1)		*Workplace Skills* (K2)					*Applied Knowledge* (K3)	
	K1-1	K1-2	K2-1	K2-2	K2-3	K2-4	K2-5	K3-1	K3-2
Sum	412.0	391.0	393.0	402.0	423.0	462.0	386.0	344.0	378.0
Max	5.0	5.0	5.0	5.0	5.0	6.0	5.0	5.0	5.0
Min	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Average	3.4	3.3	3.3	3.4	3.5	3.9	3.2	2.9	3.2
Median	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Mode	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Stdev	0.6	0.7	0.7	0.7	0.8	0.9	0.8	0.7	0.9
Varians	0.4	0.5	0.5	0.5	0.7	0.7	0.6	0.6	0.8

Hypothesis testing

The SPSS output was a regression model: Y = 49.438 + 0. 445 X + ε, (table 7), at the significance level α = 5%, the null hypothesis was rejected because the sig (0,000) < α (0.05). It can be concluded that the variable X 'learning with a scientific approach' had a significant effect on Y 'the reinforcement of the employability skills of vocational schools teacher candidates'.

Table 7 Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	49,438	6,993		7,069	.000
	Scientific approached learning	.445	.076	.476	5,886	.000

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a. Dependent Variable: Employability skills reinforcement

F test (model fitness test)

By using SPSS ANOVA, the results can be seen on table 8. Conclusion on the significance level of 5%, HO was rejected, because the value of sig (0.000) <α (0.05), then the model was fit.

Table 8 Table ANOVA [a] model match

ANOVA [a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	884,616	1	884,616	34,640	.000 [b]
	Residual	3013,376	118	25,537		
	Total	3897,992	119			
a. Dependent Variable: employability skills reinforcement						
b. Predictors: (Constant), Scientific approach						

The coefficient of determination (R^2), and correlation coefficient (R)

Correlation coefficient was R = 0, 476 means that there is a relationship between the implementation of scientific approach learning process during electrical in car body and air conditioning systems and employability skills reinforcement on vocational school teacher candidates vocational school teacher candidates in automotive engineering program with valid and reliable indicators of 22.7 % (table 9).

The coefficient of Determination value (R Square) was 0,22. Therefore, the contribution of the scientific approach implementation in reinforcing the employability skills was 22.0 %, while the remaining percentage of 78 % is influenced by other factors.

Table 9 The coefficient of determination and correlation

Model Summary [b]									
					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.476[a]	.227	.220	5,053	.227	34,640	1	118	.000
a. Predictors: (Constant), Scientific approach									
b. Dependent Variable: employability skills reinforcement									

Discussion
Learning Planning

Lecturers developed a semester learning plan (RPP) with employability skills. The semester learning plan with employability skills was written through the formulation of learning objectives, the selection of learning method, the development of learning scenarios, and the development of learning instruments with employability skills. The formulation of learning objectives was performed by including the employability character indicators and audience, behavior, condition, degree *(ABCD)* components.

The learning material on car body's electrical system practicum was a module which contained the flow diagram on the learning material; electrical lighting systems; central lock; power window; and door lock. The vocational teacher candidates read and understood the flow chart carefully, recognized the characteristics of the car body's electrical system, performed trouble shooting, and repaired the possible damages. In this example, vocational teacher candidates read and understood the images carefully was one formulation of communication skills from employability skills as intended by *BCA / ACCI, 2002*. The learning method with employability skills can be selected from a variety of learning methods that have the main characteristics to make students active in learning process. Therefore, in addition to being effective in achieving *hard skills* competencies, the vocational school candidate can also strengthen their employability skills. .

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Learning scenarios for *employability skills* were developed from pre-selected learning method such as; the group work method, the project method, and the discussion. Learning scenarios in the form of lecturer teaching activities and learning activities of prospective vocational teacher were organized in the stages of opening activities, core activities, and closing learning activities. The learning assessment was developed in the form of a booklet test to assess cognitive knowledge, observation sheets to observe the behavior (employability skills) of the vocational teacher candidate, and self-evaluation sheet to allow any prospective vocational teachers reported learning activities related to the development of their employability skills.

Learning Implementation

The scientific approach to learning is similar with the scientific method, or the scientific model commonly used in science learning (Longbotham & Longbotha, 2006; Windschits, 2007; Keyes 2010; and Schwarz, at al., 2009; Windschitl, at al., 2007). Implementation of scientific approach was carried out by applying these following steps: Observing, Questioning, Gathering information / experimenting, Associating / processing information, Communicating (5M) as shown in Figure 2.

The implementation of a scientific approach to learning can strengthen the employability skills of vocational teacher candidates in the Automotive Engineering Education study program. The learning process was carried out in these stages; (1) group learning made the vocational teacher candidates felt more confident and comfortable; (2) the stages of observing strengthened them to be more motivated and increase their curiosity; (3) the stage of experimenting / gathering information made vocational teacher candidates more comfortable to gather information that can be performed together, exchanged ideas and experiences; (4) stages of associating, adding breadth and depth to information by processing information by seeking solutions from various sources; (5) communication stage, vocational teacher candidates were trained to convey the results of learning by reporting and presenting to the class. This is in line with the integrated productive practicum management model (momantikproter) developed by Hadromi (2015). Hadromi (2015) argued that the application of momantikproter provides opportunities for teaching staff; participants learned to have an integral understanding of practicum material, and have implications for increasing motivation to optimize their potential. These steps are steps in strengthening the employability skills of vocational teacher candidates.

The results showed that scientific approach learning had a significant effect on the strengthening of employability skills of prospective vocational teachers (table 7). Furthermore, table 9 shows that the contribution of scientific approach to strengthen employability skills was 22.0%. This is possible because the scientific approach to learning involves vocational teacher candidates directly to associate learning material in real life contexts (Untoro et al., 2017; Gunawan et al., 2017; In'am & Hajar, 2017). The association of the lessons with real life context in learning makes vocational teacher candidates more creative, innovative, and are able to bring out brilliant ideas in solving problems they face (Bandaranaike, 2018; Maretta, 2016; Timeless et al., 2017; Nagl et al., 2012). It appears that as the children had more time to engage with the material, participate in cooperative peer discussions, and receive encouragement from their teachers to provide elaborated feedback to each other (Gillies, 2015), so that it could strengthen the employability skills of vocational teacher candidates.

Table 4 shows the sequence of employability skills components from the largest to the smallest is as follows: K2-4, K2-3, K1-1, K2-2, K2-1, K1-2, K2-5, K3-2 and K3-1. This data reveals that strengthening Workplace Skills (K2) and Effective Relationships (K1) are spread evenly at high levels, while the Applied Knowledge (K3) component is spread at lower level. The scientific approach is able to create an atmosphere of active learning, and can make students more creative and innovative in learning the material (Setiawan & Wilujeng, 2016; Wati, Bharati & Hartono, 2014); Nagl, Obadovic & Segedinac, 2012; Susilo, Siswandari & Bandi, 2016; and Sodik & Wijaya, 2017; Gray, D.S. and Bryce, T., 2006) supports that the scientific approach in learning process can make the learning atmosphere active and very interesting, because students are confronted with the reality of the material and the facts in their surrounding to increase their motivation to find out more.

Learning Assessment

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The implementation of the scientific approach required understanding and creativity of the lecturer in presenting the material with the scientific approach. Scientific approach has advantages and disadvantages. One of the strengths of the scientific approach is that it creates an enjoyable learning situation. The lecturer need to pay attention to several factors that influence the success of the learning process. The success of the teaching and learning process is influenced by: (1) the self of vocational teacher candidates as the main actors in the teaching and learning process, (2) the lecturer himself as the manager of the teaching and learning process with all its uniqueness, (3) the educational objectives which are the targets of achievement of the teaching and learning process, (4) learning materials as the main supporting material for the achievement of objectives, (5) ease of accessing teaching material resources, (6) the atmosphere of learning. From all the descriptions, the lecturer is one of the components that greatly determines the success of vocational teacher candidates in learning and strengthening employability skills . Therefore, lecturers must always try and innovate to find the appropriate strategies, methods, models and approach in learning (Sumayasa, 2015).

Through learning wit scientific approach, professor, lecturer and teaching staff become the learning facilitators so that the learning process can take place more effectively to improve the knowledge, skills and attitudes. Darling-Hammond (2015) corroborates that to realize students' cognition requires the teaching of broad skills from the teaching staff. In addition, Orlich et al. (2012) believes that good teaching staff reflects the way in which they will present their lessons and through their education, having various teaching strategies at their disposal (Irmita & Atun, 2018).

Concusions

Effective teaching not only involves the use of tools, techniques, and strategies but also the understanding of meaning specifically about how vocational teacher candidates learn, process information, motivate themselves, and pay attention inhibiting factors in learning. Scientific method is a learning method that regulates learning in stages that contain instructions for conducting learning to vocational teacher candidates (Zaim, 2017). The application of scientific methods can strengthen the employability skills of vocational teacher candidates. This condition is possible because learning is carried out with the scientific stages. This implementation of the scientific approach in learning could strengthen employability skills with the percentages as follows: the medium category by 6.67%, the high category by 73.33%, and 19.17% in the very high category. The amount of contribution in strengthening employability skills was 22.0%. The application of learning strategies with the scientific approach specifically strengthens employability skills in the components as follows: *Workplace Skills* (K2) and *Effective Relationships* (K1) components that spread evenly at high levels of reinforcement, while the *Applied Knowledge* (K3) component is at a moderate level of reinforcement.

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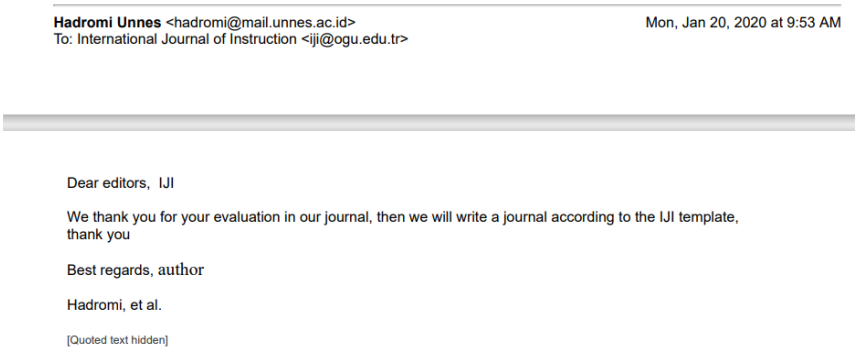

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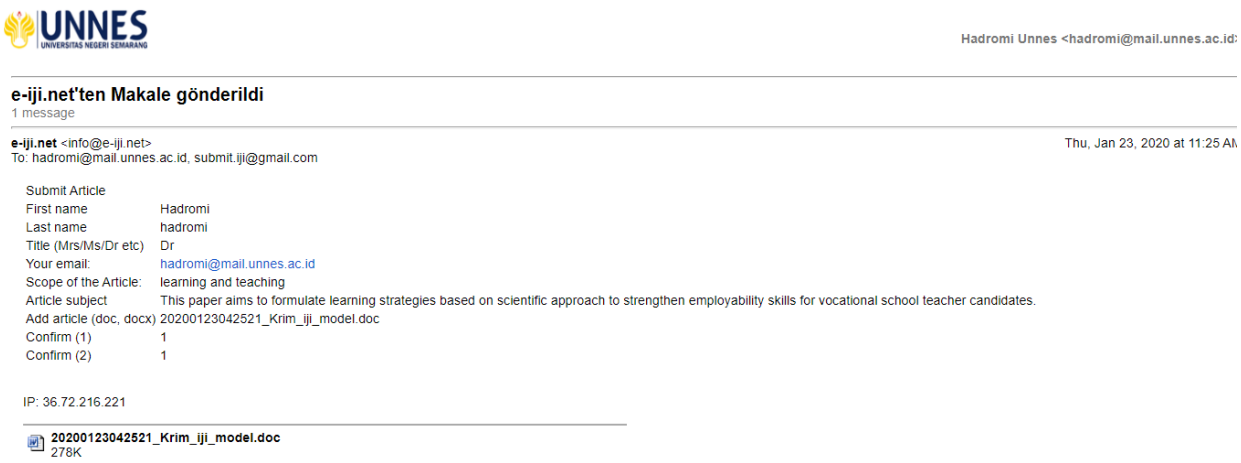

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The Learning Strategy Based On Scientific Approach To Strengthen The Employability Skill Of Teacher

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The preparation of Vocational School teacher candidates who have technical skills and employability skills begins with the learning process. This paper aims to formulate learning strategies based on scientific approach to strengthen employability skills for vocational school teacher candidates. This study employed a quantitative approach with a non-experimental survey design. The samples in the study consisted of 120 vocational teacher candidates in the Automotive Engineering Education Program, Faculty of Engineering, Universitas Negeri Semarang (UNNES) who took car body's electrical system practicum course. Research data were collected with test questions, observation sheets and questionnaires. The research data were analyzed using descriptive analysis, regression analysis. Data analysis was performed with the help of SPSS software version 20.0 for windows. The results showed that the implementation of learning strategies with scientific approach significantly strengthen employability skills of vocational teacher candidates with a contribution of 22.0%, while the remaining 78% was influenced by other factors.

Keywords: learning strategies, scientific approach, employability skills, vocational school, teacher candidates

INTRODUCTION

Vocational Education and Technology Institutions (VETIs) are educational institutions with the same level of university which are responsible for educating teacher

candidates. Automotive Engineering Education Program at the Faculty of Engineering, Universitas Negeri Semarang is a VETI that produces vocational school teacher candidates in the expertise of Automotive Engineering. Professors, lecturers, and education staffs are expected to conduct a learning process that is responsive to social roles and changes in job skills in the workplace so learners can succeed in the workplace (Hounsell, 2011).

The challenge of VETIs graduates is that the workplace demands graduates with high competition (High Fliers, 2018), VETI is challenged to create outstanding graduates who are best suited for work, innovative, creative. The industrial era 4.0 has induced changes in occupational skills at the workplace (Hamill, 2018). The impact of changes at the workplace in the industrial era 4.0 led to several changes in VETI so that the graduates remain relevant according to market needs and are ready to work. There are 10 top skills required in 2020 (Gray, 2016). Furthermore, Wagner emphasized that in entering the "occupational world" in the 21st century, seven survival skills are required: (1) critical thinking and problem solving; (2) collaboration across networks and leading by influence;(3) agility and adaptability; (4) initiatives and entrepreneurship; (5) effective oral and written communication; (6) accessing and analyzing information; and (7) curiosity and imagination (Wagner, 2008). Performance of professors, lecturers, and education staffs are influential in producing competencies and the formation of character, mentality and mindset of students (Lapsley and Ryan, 2016). The learning process is expected to develop exceptional human resources, skilled and have high skill (Orlich et al., 2013).

In Indonesia, the Ministry of Research, Technology and Higher Education (Ristekdikti) pays serious attention to VETIs to be able to produce competent teachers with good character and have high employability skills. However, the weak employability skills from VETI graduates who work as teachers both in public schools and in vocational schools, and working in the industry are often highlighted. The graduates of secondary vocational schools, diplomas and higher education are still less competent in terms of: (1) oral and written communication, (2) critical thinking and problem solving, (3) work ethics and professionalism, (4) working in teams and collaborating, (5) working in different groups, (6) using technology, and (7) project management and leadership (Trilling and Fadel, 2009). Those seven components are based on the study of Trilling and Fadel (2009). They are basic skills that every teacher candidates are required to adapt to the workplace.

The employability gap is observed by studies in various parts of the world, including Australia (Evans-Greenwood, et al., 2015); India (Smith and Edwards 2016); Malaysia (Singh and Singh, 2008); Uzbekistan (Ajwad et. al., 2014) and Pakistan (Mirzaa et al., 2017) found that a major problem in India is the employability skills of labor. In Australia, 22.4% of health entrepreneurs face difficulties in recruiting graduates with the appropriate skills (Messum et al., 2015). A total of 64% engineering entrepreneurs

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in India stated that they are only 'somewhat satisfied' with the recruitment of new workers (Messum et al. 2015. In Uzbekistan, entrepreneurs reported problems in recruiting employees with the appropriate number of skills reaching only 73% (Ajwad et al., 2014).

Based on these reviews, the efforts to reinforce the employability skills for students as teacher candidates start from the reinforcement of vocational institutions graduates. Especially if it is associated with VETIs as institutions which produce vocational school teachers, the position of employability skills is increasingly strategic to be reinforced in the learning process in VETIs.

This paper aims to formulate a learning strategy with a scientific approach to strengthen employability skills of the vocational teacher candidates. Although, it is recognized that competencies and skills are complex and challenging to learn, the vocational teacher candidates find it difficult to develop employability skills unless they are explicitly taught. Complex competencies and skills must be developed integrated with learning and not with individual learning (Hadromi, 2018)

Employability skills

Employability skills are main skills, soft skills, generic skills, main competencies, transferable skills or personal attributes (Messum et al., 2015). Employability skills as skills which are required not only to get a job, but also for the progress of the company and the workforce can contribute well for the company (Messum, et al., 2015). Employability skills are general and non-technical competencies required to do all types of work.

According to the results of a study by the American Institutes for Research (2016), employability skills that can be taught through education and workforce development systems, are divided into three broad categories; (1) Effective Relationship, the interpersonal skills and personal qualities that enable individuals to interact effectively with clients, coworkers, and supervisors; (2). Workplace Skills, the analytical and organizational skills and understanding required by employees to successfully perform work tasks; (3). Applied Knowledge, the integration of academic knowledge and wise technical skills, put to practical use in the workplace. (table 1).

Employability skills have three main parameters, namely: 1) basic skills: communication skills, information management skills, problem solving skills; 2) self-management skills: skills in demonstrating positive attitudes and behavior, responsible skills, adaptive skills, continuous learning skills, safe work skills; and 3) teamwork skills: skills in working with others in the team, skills in participating in a project or task.

The core of the learning approach based on scientific method

The Scientific Method is a series of processes for answering questions (Proyogi, 2018). Through the thought process, the hypothesis is proposed to be a temporary answer to the question, which has been posed. The scientific method as a scientific process

consists of six steps: (1) posing the problem, (2) formulating hypotheses, (3) designing an experiment, (4) making observation, (5) collecting data from the experiment, and (6) drawing conclusions (Proyogi, 2018). Scientific Method is a method to generate and answer scientific questions through observation and or experimentation.

Professors, lecturers, and educational staff of vocational subjects must be able to design learning process that can develop cognitive skills, technical skills, and soft skills in the form of employability skills simultaneously. Preparation of vocational school students who have academic skills, technical skills and employability skills stems from the education process of vocational school teacher candidates (Hadromi, 2018), A study conducted by Prayogi et al. (2018) showed that the learning process carried out by vocational teacher education institutions emphasizes on the increasingly strong employability skills of vocational teacher candidates.

Table 1

Components of employability skills

Skill	Code	Criteria	Including
Effective Relation-ships (K1)	K1-1	Interperson al skills	Understand teamwork and work with others; respond to customers' needs; leadership training; negotiations to resolve conflicts; respecting individual differences.
	K1-2	Personal quality	Demonstrating responsibility and self-discipline; adapt and show flexibility; work independently; demonstrating a desire to learn; demonstrating integrity; demonstrate professionalism; take the initiative; display a positive attitude and sense of self-worth; assume responsibility for professional growth.
Workpla ce Skills (K2)	K2-1	Resource management	Time management: manage money; managing ingredients; arrange personnel.
	K2-2	The use of information	Placing information: organize information; use information; analyze information; communicating information.
	K2-3	Communic ation skills	Communicate verbally: active listening; understand written material; convey information in writing; observe closely.
	K2-4	Systems thinking	Understand and use the system; monitor the System; improve the system
	K2-5	Use of technology	Skills in using various technologies
Applied Knowled ge (K3)	K3-1	Applied Academic Skills	Using reading skills; use writing skills; use mathematical strategies and procedures; using scientific principles and procedures.
	K3-2	Critical thinking skills	Critical thinking; creative thinking; make good decisions; solve the problem; reason; plan and organize.

(Adopted from: American Institutes for Research. 2016)

The core of learning Scientific Method aims to gain scientific knowledge systematically. The scientific approach is rooted in the scientific method, a concept that emphasizes the process of gaining scientific knowledge. Scientific methods are procedures or processes that prioritize more active and participatory methods (Simonneaux, 2014). This kind of learning strategy can support students to develop hands-on and mind-on and develop students' basic abilities such as communication, interpersonal relationships, critical thinking, and problem solving skills (Lazanyi, 2012). This was confirmed by Prain (2012) who argued that to compete in the 21st century, the young generation must at least have the following abilities; communication skills, interpersonal relationships, critical and rational thinking, problem solving, risk taking, cooperative skills, innovative skills, leadership, and technology.

Scientific method learning strategies

The application of a scientific approach to learning is basically guided by the characteristics of the scientific approach that is transformed in the steps of learning process. Steps in applying the scientific approach according to Ryan and O'Callaghan (2018) include five steps as follows. STEP 1: Make an OBSERVATION - gather and assimilate information about an event, phenomenon, process, or exception to a previous observation, etc. STEP 2: Define the PROBLEM - ask questions about the observation that are relevant and testable. Define the null hypothesis to provide unbiased results. STEP 3: Form the HYPOTHESIS - create an explanation, or educated guess, for the observation that is testable and falsifiable. STEP 4: Conduct the EXPERIMENT - devise and perform an experiment to test the hypothesis. STEP 5: Derive a THEORY - create a statement based on the outcome of the experiment that explains the observation (s) and predicts the likelihood of future observations.

In line with Ryan and O'Callaghan (2018), the Minister of Education and Culture Regulation Number 22 Year 2016 states that learning steps with a scientific approach include observing, asking, experimenting, reasoning (associating), concluding, and communicating (forming networks). These five steps are known as 5M. The scientific approach is included in the student-centered approach, because in the process, it prioritizes active students in the learning process and the teacher acts as a facilitator.

In the learning process based on a scientific approach, the domain of attitude observes the transformation of learning substance or teaching material so that students "know why." The realm of skill is observing the transformation of learning substance or teaching material so that students "know how". The realm of knowledge observes the transformation of learning substance or teaching material so that students "know what." The result is an increase and balance between the ability to be good human beings (soft skills) and people who have the skills and knowledge to live properly (hard skills) from students who includes aspects of competence, attitudes, skills, and knowledge.

RESEARCH METHODOLOGY

Research design

This study employed a quantitative approach with a non-experimental survey because the study investigated sample data obtained from the population and used a questionnaire as a data collection instrument (Sund & Leslie 1973). The study aims to determine (1) the characteristics of the scientific approach implementation and employability skills variables, (2) confirm whether the indicators of the scientific approach implementation influence the reinforcement of employability skills, and (3) determine the contribution of the scientific approach implementation to reinforcing employability skills. The implementation of the scientific approach as an independent variable, and employability skills as a dependent variable.

Population and samples.

The research population consisted of 450 students of Automotive Engineering Education Program, Mechanical Engineering Department, Faculty of Engineering, Universitas Negeri Semarang. Furthermore, the sample of this study was determined using a purposive sampling technique. Sampling was based on on consideration by involving the third semester students and the students who joined program car electrical system course, and AC systems with a total of 120 students.

Research instrument

The research instrument consisted of (1) scientific approaching learning instruments, (2). The instrument for the employability skills reinforcement of vocational school teacher candidates. The instruments used in learning activities have scientific approaches consisting of syllabus, lesson plans, practicum sheets . The instrument was validated by two vocational education experts and two education practitioners (the lecturers of Automotive Engineering Education Program). Validation was performed by giving scores for each component on the validation sheet with a score range of 1 - 4. Score 1 indicates "invalid," 2 indicates "somewhat valid," 3 indicates "valid," and 4 indicates "highly valid." Data analysis from the results of validation was conducted by calculating the average score from experts and practitioners. Validation results showed the following scores: 3, 62 (valid) for syllabus, 3.68 (valid) for lesson plans, 3.70 (valid) for job sheets. Furthermore, the instrument for the scientific approach implementation and employability skills reinforcement consists of 30 questions each. The instruments were validated by using SPSS version 20.0 for windows. The value of Person Correlation for each instrument was between 0.438 to 0.519, and 0.410 to 0, 547 with valid category.

Reliability tests were also conducted on instruments to measure scientific approach implementation, and employability skills reinforcement. Reliability testing involved 54 students who were asked to complete 30 questions that had previously been validated. A score of 54 students was then tested using Cronbach's alpha with the help of Statistical Package for Social Sciences (SPSS) version 20.0 for Windows. Reliability test showed that the Cronbach's alpha value for the scientific approach implementation was 0.747, and 0,791 for the employability skills reinforcement. Both values were greater than 0.6.

Therefore, both instruments were considered reliable. Both instruments for scientific approach implementation and employability skills reinforcement were valid and reliable to be used to collect research data

Data analysis

Data in this study were tested for their for homogeneity, normality and linearity before they were analyzed using descriptive analysis, regression analysis. The data analysis of the data was performed with the help of SPSS version 20.0 for Windows. The application of descriptive analysis was conducted to determine the variable characteristics of the scientific approach implementation and employability skills reinforcement. The regression analysis was used to determine the influence and contribution of the scientific approach implementation to employability skills reinforcement.

Prerequisite test

The prerequisite test which was performed before regression analysis consisted of homogeneity test, normality test, and linearity test. The data homogeneity test results with α: 0,5 with numerator df (n-1, where n = 120), and denominator df (n-1, with n equal to 120) showed F stat: 1.146, and F table : 1.35 . Because F count < F table, then the data had the same variance (homogeneous).

The results of normality test data using Kolmogorov-Smirnov showed the Sig. Kolmogorov Smirnov = 0.200>α = 0.05, the conclusion is that the data on scientific approach implementation and employability skills are normally distributed. The linearity test results showed the F value was fit (Deviation from linearity is 1.145 with significance 0.311 above 0.05) so that linearity requirements were met.

Stages Of Learning With Scientific Approach

Planning

The planning stage of learning process with employability skills reinforcement for vocational school teacher candidates was conducted in the following steps;

1. The lecturer prepared the learning documents; semester learning plan (RPS); teaching materials, learning media.
2. The lecturer chose a car body's electrical system practicum course that was used in conducting research.
3. Vocational teachers and prospective teachers understood the curriculum that strengthens the mutually agreed employability skills of vocational teacher candidates .
4. The vocational school teacher candidate understood the competencies that was applied in learning according to the content of the Automotive Engineering Education Study Program's Curriculum.

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5. In this context attitude / affective indicators are taken from the formulation of *employability skills* that already exist in the curriculum consisting of *Effective Relationships* (K1) , *Workplace Skills* (K2) , and *Applied Knowledge* (K3)
6. The selection of the value of employability skills to be developed in vocational school teacher candidates is used as a basis for determining learning and assessment activities.
7. Prepared the assessments; test questions, questionnaires, and observation sheets.

Implementation

The learning process which used the scientific method was carried out in three stages: (1) preliminary activities; (2) core learning activities; and (3) closing activities. Preliminary activities were carried out by giving orientation to vocational school teacher candidates about the learning material to be delivered, it was continued to provide motivation, apperception, giving references.

The core learning activities were carried out according to the steps of the scientific approach including observing, questioning, experimenting, reasoning (associating), concluding, and communicating (5M) (Utanto et al. 2017) . 5M was applied using ICT-based media and applied the learning technique / method based on students' activities that are fully illustrated in Figure 1.

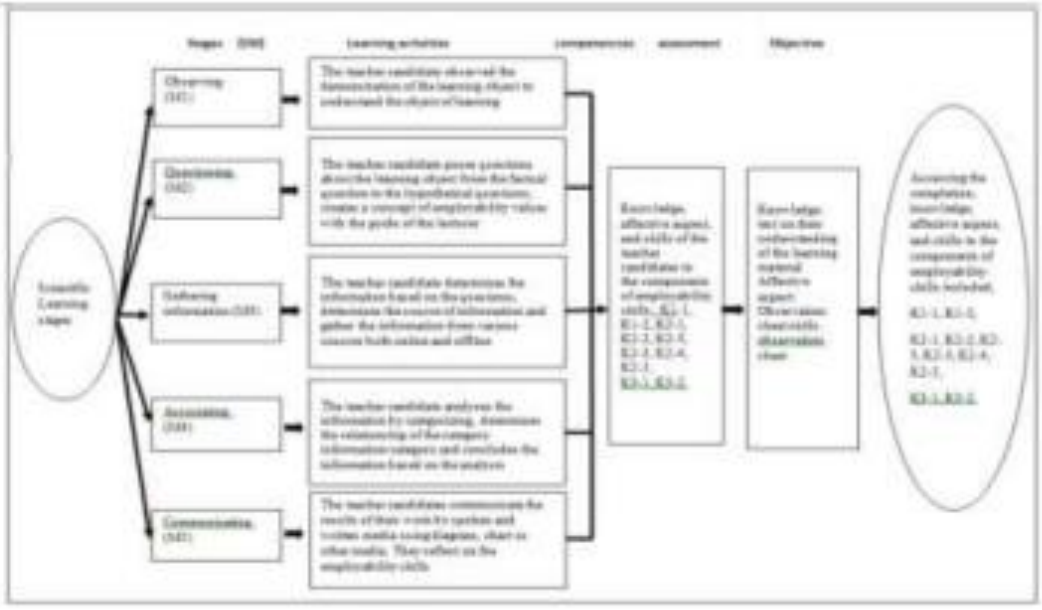

Figure 1 the stages of the implementation of learning process with a scientific approach

Closing activities were carried out by (1) making a summary / conclusion of the lesson by involving the teacher candidate; (2) checking the completion of the tasks; (3) providing feedback and direction / motivation; (4) Delivering follow-up on learning and

remedial/enrichment services; (5) Informing the material / tasks of the next meeting; (6) closing the lesson with greetings

RESULT

The Description of Scientific Approach Implementation Data

The data on the implementation of scientific approach were revealed by questionnaire consisting of 30 items in the four scale (1 - 4). A minimum score for the scientific approach implementation variable was equal to 30, the amount of the maximum score was 120, and the mean criterion $(\bar{X}k)$ was 75. The results of the research data showed that the minimum score was 74, the maximum score was 108, the mean score was 92.26, the median score was 92, the mode was 95, and the standard deviation was 6.15. By using the mean score of the criteria ($\bar{X}k = 75$), The mean score of the research data was 92.56 ($\bar{X} = 92.56$). In general, all students in Automotive Engineering Education Department, Faculty of Engineering, Universitas Negeri Semarang perceived the implementation of scientific approach in electrical and air conditioning systems were categorized as very high. Only 6.67 % of students perceived the implementation of the scientific approach in the moderate category, 74.17 % in the high category, 19.16 % in the very high category.

Table 2.

Data on strengthening of vocational teacher candidtes' employability skills

Komponen	*Effective Relationships* (K1)		*Workplace Skills* (K2)					*Applied Knowledge* (K3)	
	K1-1	K1-2	K2-1	K2-2	K2-3	K2-4	K2-5	K3-1	K3-2
Sum	412.0	391.0	393.0	402.0	423.0	462.0	386.0	344.0	378.0
Max	5.0	5.0	5.0	5.0	5.0	6.0	5.0	5.0	5.0
Min	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Average	3.4	3.3	3.3	3.4	3.5	3.9	3.2	2.9	3.2
Median	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Mode	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Stdev	0.6	0.7	0.7	0.7	0.8	0.9	0.8	0.7	0.9
Varians	0.4	0.5	0.5	0.5	0.7	0.7	0.6	0.6	0.8

Description of Employability Skills Reinforcement Data

The variable on employability skills reinforcement of the teacher candidates at vocational school was revealed by the questionnaire. The questionnaire consisted of 30 items in a scale of four (4). The minimum score was 30, the maximum score was 120. Therefore, the mean criteria ($\bar{X}k$) was 75. The results of the research data showed that the minimum score of the employability skills reinforcement was 68, the maximum score was 101, mean score was 90.49 , median score was 92.0, mode was 95, and the standard deviation was 5.71. The percentage of employability skills of students as the vocational teacher candidates in Automotive Engineering Education which were

categorized as low was 0.83, the moderate category was 6, 67%, higher category was 73.33%, and 19.17% was on the very high category.

If it is classified, the data for strengthening employability skills for prospective vocational teachers in each component, i.e. (1) *Effective Relationships* (K1), (2) *Workplace Skills* (K2), dan (3) *Applied Knowledge* (K3). (Table 2)

Hypothesis testing

The SPSS output was a regression model: $Y = 49.438 + 0.445 X + \varepsilon$, at the significance level $\alpha = 5\%$, the null hypothesis was rejected because the sig (0,000) < α (0.05). It can be concluded that the variable X 'learning with a scientific approach' had a significant effect on Y 'the reinforcement of the employability skills of vocational schools teacher candidates'.

F test (model fitness test)

By using SPSS ANOVA, Conclusion on the significance level of 5%, HO was rejected, because the value of sig (0.000) <α (0.05), then the model was fit.

The coefficient of determination (R^2) and correlation coefficient (R)

Correlation coefficient was R = 0, 476 means that there is a relationship between the implementation of scientific approach learning process during electrical in car body and air conditioning systems and employability skills reinforcement on vocational school teacher candidates vocational school teacher candidates in automotive engineering program with valid and reliable indicators of 22.7 % . The coefficient of Determination value (R Square) was 0,22. Therefore, the contribution of the scientific approach implementation in reinforcing the employability skills was 22.0 %, while the remaining percentage of 78 % is influenced by other factors.

DISCUSSION

Learning Planning

Lecturers developed a semester learning plan (RPP) with employability skills. The semester learning plan with employability skills was written through the formulation of learning objectives, the selection of learning method, the development of learning scenarios, and the development of learning instruments with employability skills. The formulation of learning objectives was performed by including the employability character indicators and audience, behavior, condition, degree *(ABCD)* components.

The learning material on car body's electrical system practicum was a module which contained the flow diagram on the learning material; electrical lighting systems; central lock; power window; and door lock. The vocational teacher candidates read and understood the flow chart carefully, recognized the characteristics of the car body's electrical system, performed trouble shooting, and repaired the possible damages. In this example, vocational teacher candidates read and understood the images carefully was one formulation of communication skills from employability skills as intended by *BCA /*

ACCI, 2002. The learning method with employability skills can be selected from a variety of learning methods that have the main characteristics to make students active in learning process. Therefore, in addition to being effective in achieving *hard skills* competencies, the vocational school candidate can also strengthen their employability skills. .

Learning scenarios for *employability skills* were developed from pre-selected learning method such as; the group work method, the project method, and the discussion. Learning scenarios in the form of lecturer teaching activities and learning activities of prospective vocational teacher were organized in the stages of opening activities, core activities, and closing learning activities. The learning assessment was developed in the form of a booklet test to assess cognitive knowledge, observation sheets to observe the behavior (employability skills) of the vocational teacher candidate, and self-evaluation sheet to allow any prospective vocational teachers reported learning activities related to the development of their employability skills.

Learning Implementation

The scientific approach to learning is similar with the scientific method, or the scientific model commonly used in science learning (Longbotham & Longbotha, 2006; and Keyes 2010). Implementation of scientific approach was carried out by applying these following steps: Observing, Questioning, Gathering information / experimenting, Associating / processing information, Communicating (5M) as shown in Figure 2.

The implementation of a scientific approach to learning can strengthen the employability skills of vocational teacher candidates in the Automotive Engineering Education study program. The learning process was carried out in these stages; (1) group learning made the vocational teacher candidates felt more confident and comfortable; (2) the stages of observing strengthened them to be more motivated and increase their curiosity; (3) the stage of experimenting / gathering information made vocational teacher candidates more comfortable to gather information that can be performed together, exchanged ideas and experiences; (4) stages of associating, adding breadth and depth to information by processing information by seeking solutions from various sources; (5) communication stage, vocational teacher candidates were trained to convey the results of learning by reporting and presenting to the class. This is in line with the integrated productive practicum management model (momantikproter) developed by Hadromi (2015). Hadromi (2015) argued that the application of momantikproter provides opportunities for teaching staff; participants learned to have an integral understanding of practicum material, and have implications for increasing motivation to optimize their potential. These steps are steps in strengthening the employability skills of vocational teacher candidates.

The results showed that scientific approach learning had a significant effect on the strengthening of employability skills of prospective vocational teachers (table 2). The contribution of scientific approach to strengthen employability skills was 22.0%. This is possible because the scientific approach to learning involves vocational teacher candidates directly to associate learning material in real life contexts (Untoro et

al., 2017; In'am & Hajar, 2017). The association of the lessons with real life context in learning makes vocational teacher candidates more creative, innovative, and are able to bring out brilliant ideas in solving problems they face (Bandaranaike, 2018). It appears that as the children had more time to engage with the material, participate in cooperative peer discussions, and receive encouragement from their teachers to provide elaborated feedback to each other (Gillies, 2015), so that it could strengthen the employability skills of vocational teacher candidates.

The sequence of employability skills components from the largest to the smallest is as follows: K2-4, K2-3, K1-1, K2-2, K2-1, K1-2, K2-5, K3-2 and K3-1. This data reveals that strengthening Workplace Skills (K2) and Effective Relationships (K1) are spread evenly at high levels, while the Applied Knowledge (K3) component is spread at lower level. The scientific approach is able to create an atmosphere of active learning, and can make students more creative and innovative in learning the material (Sodik & Wijaya, 2017) supports that the scientific approach in learning process can make the learning atmosphere active and very interesting, because students are confronted with the reality of the material and the facts in their surrounding to increase their motivation to find out more.

Learning Assessment

The implementation of the scientific approach required understanding and creativity of the lecturer in presenting the material with the scientific approach. Scientific approach has advantages and disadvantages. One of the strengths of the scientific approach is that it creates an enjoyable learning situation. The lecturer need to pay attention to several factors that influence the success of the learning process. The success of the teaching and learning process is influenced by: (1) the self of vocational teacher candidates as the main actors in the teaching and learning process, (2) the lecturer himself as the manager of the teaching and learning process with all its uniqueness, (3) the educational objectives which are the targets of achievement of the teaching and learning process, (4) learning materials as the main supporting material for the achievement of objectives, (5) ease of accessing teaching material resources, (6) the atmosphere of learning. From all the descriptions, the lecturer is one of the components that greatly determines the success of vocational teacher candidates in learning and strengthening employability skills . Therefore, lecturers must always try and innovate to find the appropriate strategies, methods, models and approach in learning (Sumayasa, 2015).

Through learning wit scientific approach, professor, lecturer and teaching staff become the learning facilitators so that the learning process can take place more effectively to improve the knowledge, skills and attitudes. Darling-Hammond (2015) corroborates that to realize students' cognition requires the teaching of broad skills from the teaching staff. In addition, Orlich et al. (2012) believes that good teaching staff reflects the way in which they will present their lessons and through their education, having various teaching strategies at their disposal (Irmita & Atun, 2018).

CONCUSIONS

Effective teaching not only involves the use of tools, techniques, and strategies but also the understanding of meaning specifically about how vocational teacher candidates learn, process information, motivate themselves, and pay attention inhibiting factors in learning. Scientific method is a learning method that regulates learning in stages that contain instructions for conducting learning to vocational teacher candidates. The application of scientific methods can strengthen the employability skills of vocational teacher candidates. This condition is possible because learning is carried out with the scientific stages. This implementation of the scientific approach in learning could strengthen employability skills with the percentages as follows: the medium category by 6.67%, the high category by 73.33%, and 19.17% in the very high category. The amount of contribution in strengthening employability skills was 22.0%. The application of learning strategies with the scientific approach specifically strengthens employability skills in the components as follows: *Workplace Skills* (K2) and *Effective Relationships* (K1) components that spread evenly at high levels of reinforcement, while the *Applied Knowledge* (K3) component is at a moderate level of reinforcement.

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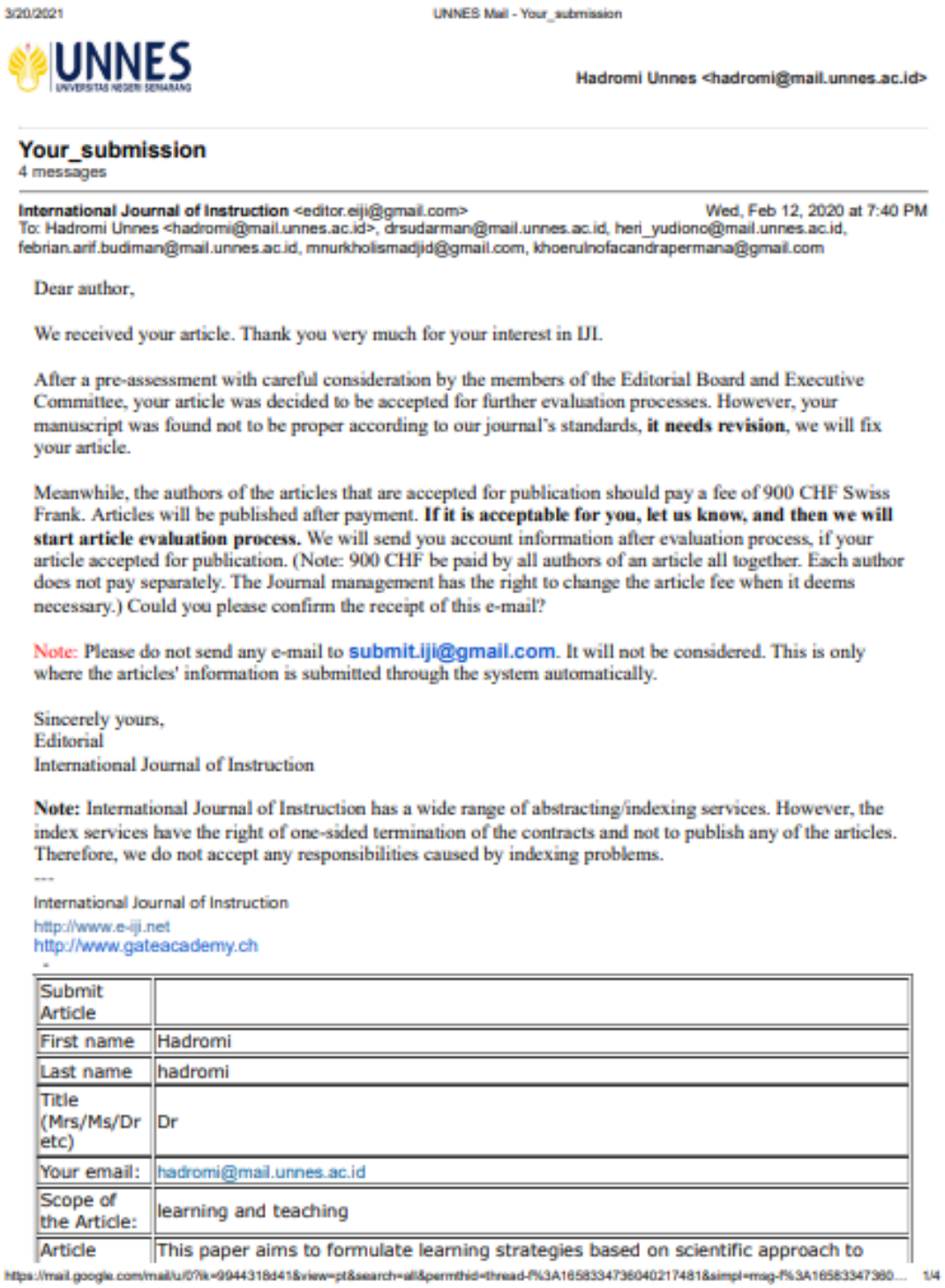

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Hadromi Unnes <hadromi@mail.unnes.ac.id>

Your_submission
4 messages

International Journal of Instruction <editor.eiji@gmail.com> Wed, Feb 12, 2020 at 7:40 PM
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Dear author,

We received your article. Thank you very much for your interest in IJI.

After a pre-assessment with careful consideration by the members of the Editorial Board and Executive Committee, your article was decided to be accepted for further evaluation processes. However, your manuscript was found not to be proper according to our journal's standards, **it needs revision**, we will fix your article.

Meanwhile, the authors of the articles that are accepted for publication should pay a fee of 900 CHF Swiss Frank. Articles will be published after payment. **If it is acceptable for you, let us know, and then we will start article evaluation process.** We will send you account information after evaluation process, if your article accepted for publication. (Note: 900 CHF be paid by all authors of an article all together. Each author does not pay separately. The Journal management has the right to change the article fee when it deems necessary.) Could you please confirm the receipt of this e-mail?

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subject	strengthen employability skills for vocational school teacher candidates.
Add article (doc, docx)	20200123042521_Krim_iji_model.doc

Hadromi Unnes <hadromi@mail.unnes.ac.id> Wed, Feb 12, 2020 at 11:16 PM
To: International Journal of Instruction <editor.eiji@gmail.com>
Cc: drsudarman@mail.unnes.ac.id, heri_yudiono@mail.unnes.ac.id, febrian.arif.budiman@mail.unnes.ac.id, mnurkholismadjid@gmail.com, khoerulnofacandrapermana@gmail.com

Yes, I accept.
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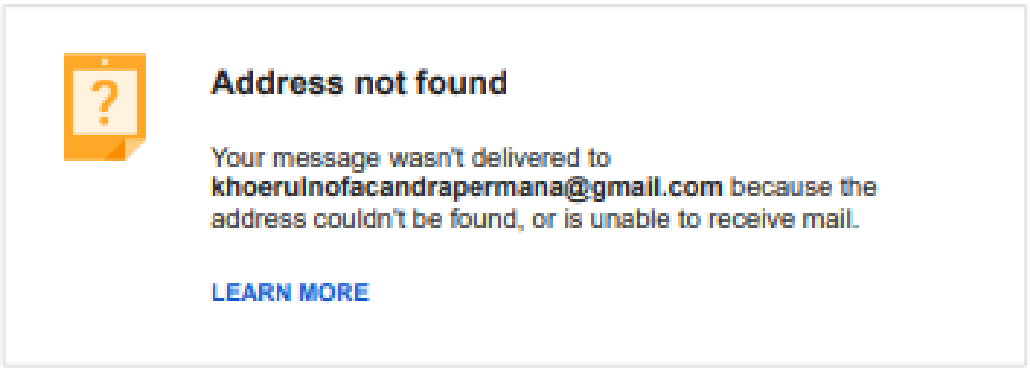

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Final-Recipient: rfc822; khoerulnofacandrapermana@gmail.com
Action: failed
Status: 5.1.1
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Email. 3 April 2020 (hasil evaluasi): IJI

Lampiran 8: Email IJI mengirim hasil evaluasi artikel ke penulis.

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Hadromi Unnes <hadromi@mail.unnes.ac.id>

Amendments
6 messages

iji@ogu.edu.tr <iji@ogu.edu.tr> Fri, Apr 3, 2020 at 5:46 AM
To: hadromi@mail.unnes.ac.id, drsudarman@mail.unnes.ac.id, heri_yudiono@mail.unnes.ac.id, febrian.arif.budiman@mail.unnes.ac.id

Dear author

You have amendments from reviewers. Could you please amend **on attached file "Article 050220_for revision"** and send back your revised article and the list of explanations of the revisions done via e-mail (iji@ogu.edu.tr) as an attached file as soon as possible? **mnurkholismadjid@gmail.com, khoerulnofacandrapermana@gmail.com** are not valid. Could you send valid e-mail? Valid e-mail of all authors should be written.

Sincerely yours,
Editorial
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Lampiran 9. Hasil evaluasi artikel dari evaluator 1

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Asim ARI
Editor in Chief

Name of the article: The Learning Strategy Based on Scientific Approach to Strengthen the Employability Skill of Teacher

After reviewing the attached article, please read each item carefully and select the response that best reflects your opinion. To register your response, please **mark** or **type in** the appropriate block.

	Yes	Partially	No
Do you think the title is appropriate?	☐	☒	☐
Does the abstract summarize the article clearly and effectively?	☐	☒	☐
Are the objectives set clearly?	☐	☒	☐
Is the issue stated clearly?	☐	☒	☐
Is the literature review adequate?	☐	☒	☐
Is the design of the research appropriate, and the exemplary, if any, suitable?	☒	☐	☐
Is the methodology consistent with the practice?	☐	☒	☐
Are the findings expressed clearly?	☐	☒	☐
Is the presentation of the findings adequate and consistent?	☒	☐	☐
Are the tables, if any, arranged well?	☐	☒	☐
Are the conclusions and generalizations based on the findings?	☐	☒	☐
Are the suggestions meaningful, valid, and based on the findings?	☒	☐	☐
Are the references adequate?	☐	☒	☐
Is the language clear and understandable?	☐	☒	☐
Is cohesion achieved throughout the article?	☐	☒	☐
Is the work contributing to the field?	☒	☐	☐

Evaluation:

- ☐ The article can be published as it is.
- ☒ The article can be published after some revision.
- ☐ The article must undergo a major revision before it can be resubmitted to the journal.
- ☐ The article cannot be published.

Would you like to see the revised article if you have suggested any revisions? ☒ Yes ☐ No

Please write your report either on this paper or on a spare paper.

REPORT

Section of the Manuscript	Comments and Notes
Title- Abstract- Summary	1. Please add the other name of this university name in English 2. Change "practicum" to "practice" 3. Where is conclusion? see details on comments in attached file
Introduction and Literature Review	1.Add 5 references from Scopus Q3 journal 2. Please check again and use APA style 3. What kind of character? Explain in details

.

	4. There was a little review. Please add several references for state of the art 5. check grammar see details on comments in attached file
Research Methods	1. Validation was performed by giving scores for each component on the validation sheet with a score range of 1 - 4. Score 1 indicates "invalid," 2 indicates "somewhat valid," 3 indicates "valid," and 4 indicates "highly valid." please Change above category into Table format 2. Don't use numbering, change to paragraph 3. Please add more higher resolution figure see details on comments in attached file
Research Findings	Add explanation about "K1-1, K1-2 etc" under the table
Discussion	1. The scientific approach to learning is similar with the scientific method, or the scientific model commonly used in science learning (Longbotham & Longbotha, 2006; and Keyes 2010) explain the different between scientific method and approach 2.Why scientific approach can strengthen employability skills? Explain with your argumentation 3.Why you choose this word? What the indicators of "enjoyable" in this context? Could you please explain this word? 4. Why teacher candidates more confident? Explain further with your argumentation see details on comments in attached file
Conclusion and Suggestions	Please add some suggestion for further research
References and Citation	please add 20 article of Scopus indexed journal to support your research (article since 2014)
Language	please check the grammar
Other issues	please revise carefully

.

Lampiran 10. Hasil evaluasi artikel dari evaluator 2

International Journal of Instruction Article Evaluation Form

Mr. /Mrs.

It is to acknowledge you that the Executive Committee of *International Journal of Instruction* has decided that the article mentioned below would be reviewed by you. Thank you very much for your contributions.

Asim ARI
Editor in Chief

Name of the article: The Learning Strategy Based on Scientific Approach to Strengthen the Employability Skill of Teacher

After reviewing the attached article, please read each item carefully and select the response that best reflects your opinion. To register your response, please **mark** or **type in** the appropriate block.

	Yes	Partially	No
Do you think the title is appropriate?	☐	☒	☐
Does the abstract summarize the article clearly and effectively?	☐	☒	☐
Are the objectives set clearly?	☒	☐	☐
Is the issue stated clearly?	☐	☒	☐
Is the literature review adequate?	☒	☐	☐
Is the design of the research appropriate, and the exemplary, if any, suitable?	☒	☐	☐
Is the methodology consistent with the practice?	☐	☒	☐
Are the findings expressed clearly?	☒	☐	☐
Is the presentation of the findings adequate and consistent?	☐	☒	☐
Are the tables, if any, arranged well?	☒	☐	☐
Are the conclusions and generalizations based on the findings?	☒	☐	☐
Are the suggestions meaningful, valid, and based on the findings?	☐	☒	☐
Are the references adequate?	☐	☒	☐
Is the language clear and understandable?	☒	☐	☐
Is cohesion achieved throughout the article?	☒	☐	☐
Is the work contributing to the field?	☒	☐	☐

Evaluation:

☐ The article can be published as it is.
☒ The article can be published after some revision.
☐ The article must undergo a major revision before it can be resubmitted to the journal.
☐ The article cannot be published.

Would you like to see the revised article if you have suggested any revisions? ☒ Yes ☐ No

Please write your report either on this paper or on a spare paper.

REPORT

Section of the Manuscript	Comments and Notes
Title- Abstract- Summary	Good
Introduction and Literature Review	Good
Research Methods	Good
Research Findings	Enough

.

Discussion	Can quote several theories
Conclusion and Suggestions	Enough
References and Citation	References and quotes from IJI are added
Language	Good
Other issues	Good

.

Lampiran 11. Hasil evaluasi artikel dari evaluator 3

International Journal of Instruction Article Evaluation Form

Mr. /Mrs.

It is to acknowledge you that the Executive Committee of *International Journal of Instruction* has decided that the article mentioned below would be reviewed by you. Thank you very much for your contributions.

Asim ARI
Editor in Chief

Name of the article: The Learning Strategy Based on Scientific Approach to Strengthen the Employability Skill of Teacher

After reviewing the attached article, please read each item carefully and select the response that best reflects your opinion. To register your response, please **mark** or **type in** the appropriate block.

	Yes	Partially	No
Do you think the title is appropriate?	☐	☐	☒
Does the abstract summarize the article clearly and effectively?	☐	☒	☐
Are the objectives set clearly?	☐	☐	☒
Is the issue stated clearly?	☐	☐	☒
Is the literature review adequate?	☐	☒	☐
Is the design of the research appropriate, and the exemplary, if any, suitable?	☐	☒	☐
Is the methodology consistent with the practice?	☐	☐	☒
Are the findings expressed clearly?	☐	☒	☐
Is the presentation of the findings adequate and consistent?	☐	☒	☐
Are the tables, if any, arranged well?	☐	☒	☐
Are the conclusions and generalizations based on the findings?	☐	☐	☒
Are the suggestions meaningful, valid, and based on the findings?	☐	☒	☐
Are the references adequate?	☐	☒	☐
Is the language clear and understandable?	☐	☒	☐
Is cohesion achieved throughout the article?	☐	☐	☒
Is the work contributing to the field?	☐	☐	☒

Evaluation:

- ☐ The article can be published as it is.
- ☐ The article can be published after some revision.
- ☒ The article must undergo a major revision before it can be resubmitted to the journal.
- ☐ The article cannot be published.

Would you like to see the revised article if you have suggested any revisions? ☒ Yes ☐ No

Please write your report either on this paper or on a spare paper.

REPORT

Section of the Manuscript	Comments and Notes
Title- Abstract- Summary	The abstract summararize it needs to be clearly and effectively
Introduction and Literature Review	Introduction it needs to be supported by the relevant data from other researches. Literatur review Not just citing the theory but needs to be discussed and reviewed to support the importance of this issue is examined
Research Methods	Researchers should write a heading called "data collection instruments". Then, they can give some explanations about the validity and reliability of these instruments.

.

Research Findings	This article is not yet simply state what you found arranged in a logical sequence Preferably preceded by an introductory paragraph before entering the presentation of data to clarify the findings of which will be described
Discussion	it needs to be clarity of the uniqueness and the shortcomings of this study compared with previous studies Present tense to explain significance of results • Past tense to summarize findings, with present tense to interpret results
Conclusion and Suggestions	It must be clear what is the added value of this research to previous reports. It is obligatory to make sure that reported new information is significant for international level readers of IJI
References and Citation	APA 6 should be considered for the references part and use mendeley
Language	Grammar past simple
Other issues	It needs to be clear

.

Lampiran 12. Daftar hasil revisi

The following changes have been made on the Manuscript "…" in accordance with reviewers' comments

Reviewer's comments	Changes made	Page (see highlights)

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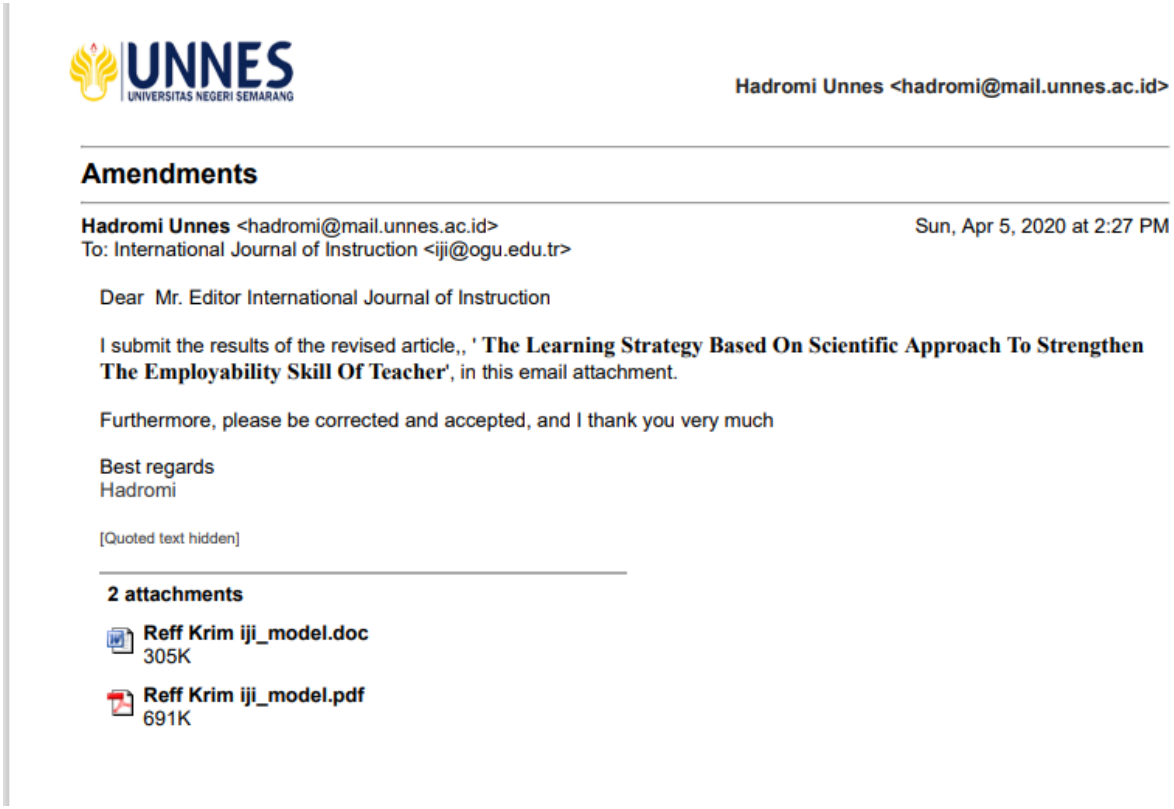
Email 5 April 2020: Penulis
Lampiran 13. Submit hasil refisi tanggal 3 April 2020

1. Pengantar email



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Hadromi Unnes <hadromi@mail.unnes.ac.id>

Amendments

Hadromi Unnes <hadromi@mail.unnes.ac.id> Sun, Apr 5, 2020 at 2:27 PM
To: International Journal of Instruction <iji@ogu.edu.tr>

Dear Mr. Editor International Journal of Instruction

I submit the results of the revised article,, ' **The Learning Strategy Based On Scientific Approach To Strengthen The Employability Skill Of Teacher**', in this email attachment.

Furthermore, please be corrected and accepted, and I thank you very much

Best regards
Hadromi

[Quoted text hidden]

2 attachments

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Lampiran 14. Draf artikel hasil refisi

The Learning Strategy Based On Scientific Approach To Strengthen The Employability Skill Of Teacher

Hadromi, Asst. Prof., corresponding author, Semarang State University, Sekaran-Gunungpati kota Semarang, Central Java Province Indonesia Indonesia, *hadromi@mail.unnes.ac.id* Hp: +6281325739798

Sudarman, Prof, Semarang State University, Sekaran- Gunungpati kota Semarang, Central Java Province, Indonesia, *drsudarman@mail.unnes.ac.id*

Heri Yudiono, Asst. Prof., Semarang State University, Sekaran- Gunungpati kota Semarang, Central Java Province, Indonesia, heri_yudiono@mail.unnes.ac.id.

Febrian Arief Budiman, Semarang State University, Sekaran- Gunungpati kota Semarang, Central Java Province, Indonesia, *febrian.arif.budiman@mail.unnes.ac.id.*

Muhamad Nurkholis Majid, Semarang State University, Sekaran- Gunungpati kota Semarang, Central Java Province, Indonesia, *mnurkholismadjid@gmail.com.*

Khoerul Nofa Candra Permana, Semarang State University, Sekaran- Gunungpati kota Semarang, Central Java Prov, Indonesia, khoerulpermana123@gmail.com

The preparation of Vocational School teacher candidates who have technical skills and employability skills begins with the learning process. This paper aims to formulate learning strategies based on scientific approach to strengthen employability skills for vocational school teacher candidates. This study employed a quantitative approach with a non-experimental survey design. The samples in the study consisted of 120 vocational teacher candidates in the Automotive Engineering Education Program, Faculty of Engineering, Semarang State University (UNNES) who took car body's electrical system practice course. Research data were collected with test questions, observation sheets and questionnaires. The research data were analyzed using descriptive analysis, regression analysis. Data analysis was performed with the help of SPSS software version 20.0 for windows. The results showed that the implementation of learning strategies with scientific approach significantly strengthen employability skills of vocational teacher candidates with a contribution of 22.0%, while the remaining 78% was influenced by other factors. The reinforcement of employability skills vocational teacher candidates resulted in the reinforcement of the competitiveness of prospective graduates. When they have become vocational teachers, they are able to produce competitive vocational school graduates in 4.0 industry era.

Keywords: learning strategies, scientific approach, employability skills, vocational school, teacher candidates

INTRODUCTION

Vocational Education and Technology Institutions (VETIs) are educational institutions with the same level of university which are responsible for educating teacher candidates. Automotive Engineering Education Program at the Faculty of Engineering, Semarang State University is a VETI that produces vocational school teacher candidates in the expertise of Automotive Engineering. Professors, lecturers, and education staffs are expected to conduct a learning process that is responsive to social roles and changes in job skills in the workplace so learners can succeed in the workplace (Hounsell, 2011).

The challenge of VETIs graduates is that the workplace demands graduates with high competition (High Fliers, 2018), VETI is challenged to create outstanding graduates who are best suited for work, innovative, creative (Motallebzadeh et al. 2018). The industrial era 4.0 has induced changes in occupational skills at the workplace (Hamill, 2018). The impact of changes at the workplace in the industrial era 4.0 led to several changes in VETI so that the graduates remain relevant according to market needs and are ready to work. There are 10 top skills required in 2020 (Gray, 2016). Furthermore, Wagner emphasized that in entering the "occupational world" in the 21st century, seven survival skills are required: *(*1) critical thinking and problem solving; (2) collaboration across networks and leading by influence;(3) agility and adaptability; (4) initiatives and entrepreneurship; (5) effective oral and written communication; (6) accessing and analyzing information; and (7) curiosity and imagination (Wagner, 2010). Performance of professors, lecturers, and education staffs are influential in producing competencies and the formation of character, mentality and mindset of students (Lapsley & Ryan, 2016). The learning process is expected to develop exceptional human resources, skilled and have high skill (Orlich et al. 2012).

In Indonesia, the Ministry of Research, Technology and Higher Education (Ristekdikti) pays serious attention to VETIs to be able to produce competent teachers with good character and have high employability skills. However, the weak employability skills from VETI graduates who work as teachers both in public schools and in vocational schools, and working in the industry are often highlighted. The graduates of secondary vocational schools, diplomas and higher education are still less competent in terms of: (1) oral and written communication, (2) critical thinking and problem solving, (3) work ethics and professionalism, (4) working in teams and collaborating, (5) working in different groups, (6) using technology, and (7) project management and leadership (Trilling & Fadel, 2009). Those seven components are based on the study of Trilling and Fadel (2009). They are basic skills that every teacher candidates are required to adapt to the workplace.

The employability gap is observed by studies in various parts of the world, including Australia (Evans-Greenwood et al. 2015); India (Smith & Edwards, 2012); Malaysia

(Singh & Singh, 2008); Uzbekistan (Ajwad et. al. 2014) and Pakistan (Mirza et al. 2014) found that a major problem in India is the employability skills of labor. In Australia, 22.4% of health entrepreneurs face difficulties in recruiting graduates with the appropriate skills (Messum et al. 2015). A total of 64% engineering entrepreneurs in India stated that they are only 'somewhat satisfied' with the recruitment of new workers (Messum et al. 2015. In Uzbekistan, entrepreneurs reported problems in recruiting employees with the appropriate number of skills reaching only 73% (Ajwad et al. 2014).

Based on these reviews, the efforts to reinforce the employability skills for students as teacher candidates start from the reinforcement of vocational institutions graduates. Especially if it is associated with VETIs as institutions which produce vocational school teachers, the position of employability skills is increasingly strategic to be reinforced in the learning process in VETIs.

This paper aims to formulate a learning strategy with a scientific approach to strengthen employability skills of the vocational teacher candidates. Although, it is recognized that competencies and skills are complex and challenging to learn, the vocational teacher candidates find it difficult to develop employability skills unless they are explicitly taught. Complex competencies and skills must be developed integrated with learning and not with individual learning (Hadromi, 2018)

Employability skills

Employability skills are main skills, soft skills, generic skills, main competencies, transferable skills or personal attributes (Messum et al. 2015). Employability skills as skills which are required not only to get a job, but also for the progress of the company and the workforce can contribute well for the company (Messum et al. 2015). Employability skills are general and non-technical competencies required to do all types of work.

According to the results of a study by the American Institutes for Research (2016), employability skills that can be taught through education and workforce development systems, are divided into three broad categories; (1) Effective Relationship, the interpersonal skills and personal qualities that enable individuals to interact effectively with clients, coworkers, and supervisors; (2). Workplace Skills, the analytical and organizational skills and understanding required by employees to successfully perform work tasks; (3). Applied Knowledge, the integration of academic knowledge and wise technical skills, put to practical use in the workplace. (table 1).

Employability skills have three main parameters, namely: 1) basic skills: communication skills, information management skills, problem solving skills; 2) self-management skills: skills in demonstrating positive attitudes and behavior, responsible skills, adaptive skills, continuous learning skills, safe work skills; and 3) teamwork skills: skills in working with others in the team, skills in participating in a project or task.

Table 1

Components of employability skills

Skill	Code	Criteria	Including
Effective Relation-ships (K1)	K1-1	Interperson al skills	Understand teamwork and work with others; respond to customers' needs; leadership training; negotiations to resolve conflicts; respecting individual differences.
	K1-2	Personal quality	Demonstrating responsibility and self-discipline; adapt and show flexibility; work independently; demonstrating a desire to learn; demonstrating integrity; demonstrate professionalism; take the initiative; display a positive attitude and sense of self-worth; assume responsibility for professional growth.
Workpla ce Skills (K2)	K2-1	Resource management	Time management: manage money; managing ingredients; arrange personnel.
	K2-2	The use of information	Placing information: organize information; use information; analyze information; communicating information.
	K2-3	Communic ation skills	Communicate verbally: active listening; understand written material; convey information in writing; observe closely.
	K2-4	Systems thinking	Understand and use the system; monitor the System; improve the system
	K2-5	Use of technology	Skills in using various technologies
Applied Knowled ge (K3)	K3-1	Applied academic skills	Using reading skills; use writing skills; use mathematical strategies and procedures; using scientific principles and procedures.
	K3-2	Critical thinking skills	Critical thinking; creative thinking; make good decisions; solve the problem; reason; plan and organize.

(Adopted from: American Institutes for Research. 2016)

The core of the learning approach based on scientific approach

The scientific approach is a series of processes for answering questions (Prayogi & Yuanita, 2018). Through the thought process, the hypothesis is proposed to be a temporary answer to the question, which has been posed (Putra et al. 2020). The scientific approach as a scientific process consists of six steps: (1) posing the problem, (2) formulating hypotheses, (3) designing an experiment, (4) making observation, (5) collecting data from the experiment, and (6) drawing conclusions ((Prayogi & Yuanita, 2018). scientific approach is a method to generate and answer scientific questions through observation and or experimentation.

Professors, lecturers, and educational staff of vocational subjects must be able to design learning process that can develop cognitive skills, technical skills, and soft skills in the form of employability skills simultaneously. Preparation of vocational school students

who have academic skills, technical skills and employability skills stems from the education process of vocational school teacher candidates (Hadromi, 2018), A study conducted by (Prayogi & Yuanita, 2018). (2018) showed that the learning process carried out by vocational teacher education institutions emphasizes on the increasingly strong employability skills of vocational teacher candidates.

The core of learning scientific approach aims to gain scientific knowledge systematically. The scientific approach is rooted in the scientific approach, a concept that emphasizes the process of gaining scientific knowledge. Scientific approach are procedures or processes that prioritize more active and participatory methods (Simonneaux, 2014). This kind of learning strategy can support students to develop hands-on and mind-on and develop students' basic abilities such as communication, interpersonal relationships, critical thinking, and problem solving skills (Lazanyi, 2012). This was confirmed by Prain (2012) who argued that to compete in the 21st century, the young generation must at least have the following abilities; communication skills, interpersonal relationships, critical and rational thinking, problem solving, risk taking, cooperative skills, innovative skills, leadership, and technology.

Scientific approach learning strategies

The application of a scientific approach to learning is basically guided by the characteristics of the scientific approach that is transformed in the steps of learning process. Steps in applying the scientific approach according to Ryan and O'Callaghan (2018) include five steps as follows. STEP 1: Make an OBSERVATION - gather and assimilate information about an event, phenomenon, process, or exception to a previous observation, etc. STEP 2: Define the PROBLEM - ask questions about the observation that are relevant and testable. Define the null hypothesis to provide unbiased results. STEP 3: Form the HYPOTHESIS - create an explanation, or educated guess, for the observation that is testable and falsifiable. STEP 4: Conduct the EXPERIMENT - devise and perform an experiment to test the hypothesis. STEP 5: Derive a THEORY - create a statement based on the outcome of the experiment that explains the observation (s) and predicts the likelihood of future observations.

In line with Ryan and O'Callaghan (2018), the Minister of Education and Culture Regulation Number 22 Year 2016 states that learning steps with a scientific approach include observing, asking, experimenting, reasoning (associating), concluding, and communicating (forming networks). These five steps are known as 5M. The scientific approach is included in the student-centered approach, because in the process, it prioritizes active students in the learning process and the teacher acts as a facilitator.

In the learning process based on a scientific approach, the domain of attitude observes the transformation of learning substance or teaching material so that students "know why." The realm of skill is observing the transformation of learning substance or teaching material so that students "know how". The realm of knowledge observes the transformation of learning substance or teaching material so that students "know what." The result is an increase and balance between the ability to be good human beings (soft

skills) and people who have the skills and knowledge to live properly (hard skills) from students who includes aspects of competence, attitudes, skills, and knowledge.

RESEARCH METHODOLOGY

Research design

This study employed a quantitative approach with a non-experimental survey because the study investigated sample data obtained from the population and used a questionnaire as a data collection instrument (Sund & Leslie 1973). The study aims to determine (1) the characteristics of the scientific approach implementation and employability skills variables, (2) confirm whether the indicators of the scientific approach implementation influence the reinforcement of employability skills, and (3) determine the contribution of the scientific approach implementation to reinforcing employability skills. The implementation of the scientific approach as an independent variable, and employability skills as a dependent variable.

Population and samples.

The research population consisted of 450 students of Automotive Engineering Education Program, Mechanical Engineering Department, Faculty of Engineering, Semarang State University. Furthermore, the sample of this study was determined using a purposive sampling technique. Sampling was based on on consideration by involving the third semester students and the students who joined program car electrical system course, and AC systems with a total of 120 students.

Research instrument

The research instrument consisted of (1) scientific approaching learning instruments, (2). The instrument for the employability skills reinforcement of vocational school teacher candidates. The instruments used in learning activities have scientific approaches consisting of syllabus, lesson plans, practice sheets . The instrument was validated by two vocational education experts and two education practitioners (the lecturers of Automotive Engineering Education Program). Validation was performed by giving scores for each component on the validation sheet with a score range of 1 - 4. Score 1 indicates "invalid," 2 indicates "somewhat valid," 3 indicates "valid," and 4 indicates "highly valid." Data analysis from the results of validation was conducted by calculating the average score from experts and practitioners. Validation results showed the following scores: 3, 62 (valid) for syllabus, 3.68 (valid) for lesson plans, 3.70 (valid) for job sheets. Furthermore, the instrument for the scientific approach implementation and employability skills reinforcement consists of 30 questions each. The instruments were validated by using SPSS version 20.0 for windows. The value of Person Correlation for each instrument was between 0.438 to 0.519, and 0.410 to 0, 547 with valid category.

Reliability tests were also conducted on instruments to measure scientific approach implementation, and employability skills reinforcement. Reliability testing involved 54 students who were asked to complete 30 questions that had previously been validated. A score of 54 students was then tested using Cronbach's alpha with the help of Statistical Package for Social Sciences (SPSS) version 20.0 for Windows. Reliability test showed that the Cronbach's alpha value for the scientific approach implementation was 0.747, and 0,791 for the employability skills reinforcement. Both values were greater than 0.6. Therefore, both instruments were considered reliable. Both instruments for scientific approach implementation and employability skills reinforcement were valid and reliable to be used to collect research data

Data analysis

Data in this study were tested for their for homogeneity, normality and linearity before they were analyzed using descriptive analysis, regression analysis. The data analysis of the data was performed with the help of SPSS version 20.0 for Windows. The application of descriptive analysis was conducted to determine the variable characteristics of the scientific approach implementation and employability skills reinforcement. The regression analysis was used to determine the influence and contribution of the scientific approach implementation to employability skills reinforcement.

Prerequisite test

The prerequisite test which was performed before regression analysis consisted of homogeneity test, normality test, and linearity test. The data homogeneity test results with α: 0,5 with numerator df (n-1, where n = 120), and denominator df (n-1, with n equal to 120) showed F stat: 1.146, and F table : 1.35 . Because F count < F table, then the data had the same variance (homogeneous).

The results of normality test data using Kolmogorov-Smirnov showed the Sig. Kolmogorov Smirnov = 0.200>α = 0.05, the conclusion is that the data on scientific approach implementation and employability skills are normally distributed. The linearity test results showed the F value was fit (Deviation from linearity is 1.145 with significance 0.311 above 0.05) so that linearity requirements were met.

Stages Of Learning With Scientific Approach

Planning

The planning stage of learning process with employability skills reinforcement for vocational school teacher candidates was conducted in the following steps;

1 The lecturer prepared the learning documents; semester learning plan (RPS); teaching materials, learning media.

2. The lecturer chose a car body's electrical system practice course that was used in conducting research.
3. Vocational teachers and prospective teachers understood the curriculum that strengthens the mutually agreed employability skills of vocational teacher candidates .
4. The vocational school teacher candidate understood the competencies that was applied in learning according to the content of the Automotive Engineering Education Study Program's Curriculum.
5. In this context attitude / affective indicators are taken from the formulation of *employability skills* that already exist in the curriculum consisting of *Effective Relationships* (K1) , *Workplace Skills* (K2) , and *Applied Knowledge* (K3)
6. The selection of the value of employability skills to be developed in vocational school teacher candidates is used as a basis for determining learning and assessment activities.
7. Prepared the assessments; test questions, questionnaires, and observation sheets.

Implementation

The learning process which used the scientific approach was carried out in three stages: (1) preliminary activities; (2) core learning activities; and (3) closing activities. Preliminary activities were carried out by giving orientation to vocational school teacher candidates about the learning material to be delivered, it was continued to provide motivation, apperception, giving references.

The core learning activities were carried out according to the steps of the scientific approach including observing, questioning, experimenting, reasoning (associating), concluding, and communicating (5M) (Utanto et al. 2017) . 5M was applied using ICT-based media and applied the learning technique / method based on students' activities that are fully illustrated in Figure 1.

Closing activities were carried out by (1) making a summary / conclusion of the lesson by involving the teacher candidate; (2) checking the completion of the tasks; (3) providing feedback and direction / motivation; (4) Delivering follow-up on learning and remedial/enrichment services; (5) Informing the material / tasks of the next meeting; (6) closing the lesson with greetings

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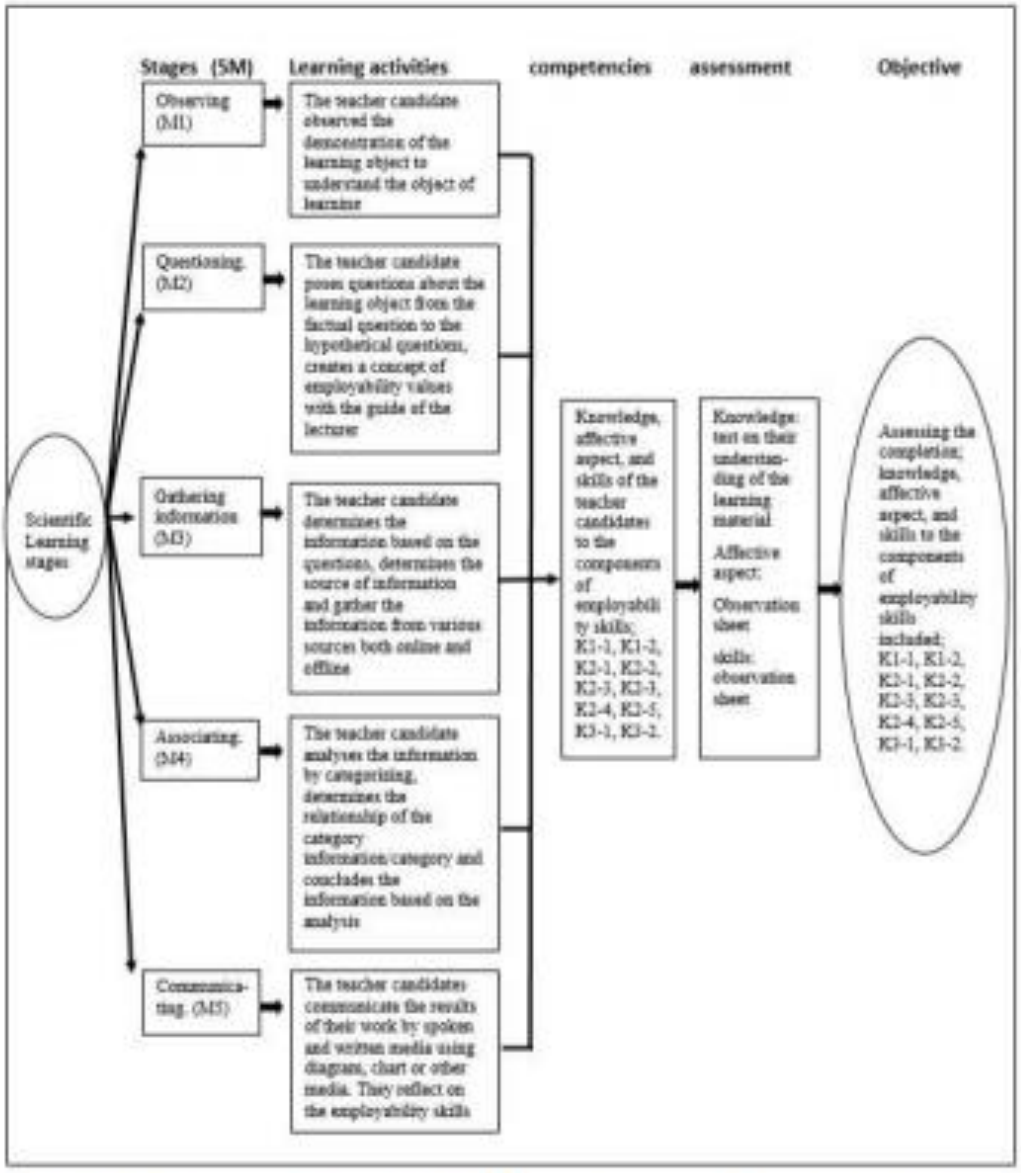

Figure 1 the stages of the implementation of learning process with a scientific approach

FINDINGS

The Description of Scientific Approach Implementation Data

The data on the implementation of scientific approach were revealed by questionnaire consisting of 30 items in the four scale (1 - 4). A minimum score for the scientific approach implementation variable was equal to 30, the amount of the maximum score was 120, and the mean criterion *(X ¯ k)* was 75. The results of the research data showed

that the minimum score was 74, the maximum score was 108, the mean score was 92.26, the median score was 92, the mode was 95, and the standard deviation was 6.15. By using the mean score of the criteria ($\bar{X}k = 75$), The mean score of the research data was 92.56 ($\bar{X} = 92.56$). In general, all students in Automotive Engineering Education Department, Faculty of Engineering, Semarang State University perceived the implementation of scientific approach in electrical and air conditioning systems were categorized as very high. Only 6.67 % of students perceived the implementation of the scientific approach in the moderate category, 74.17 % in the high category, 19.16 % in the very high category.

Table 2.

Data on strengthening of vocational teacher candidtes' employability skills

Komponen	*Effective Relationships* (K1)		*Workplace Skills* (K2)					*Applied Knowledge* (K3)	
	K1-1	K1-2	K2-1	K2-2	K2-3	K2-4	K2-5	K3-1	K3-2
Sum	412.0	391.0	393.0	402.0	423.0	462.0	386.0	344.0	378.0
Max	5.0	5.0	5.0	5.0	5.0	6.0	5.0	5.0	5.0
Min	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Average	3.4	3.3	3.3	3.4	3.5	3.9	3.2	2.9	3.2
Median	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Mode	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Stdev	0.6	0.7	0.7	0.7	0.8	0.9	0.8	0.7	0.9
Varians	0.4	0.5	0.5	0.5	0.7	0.7	0.6	0.6	0.8

Note: K1-1: Interpersonal skills, K1-2: Personal quality, K2-1: Resource management, K2-2: The use of information, K2-3: Communication skills, K2-4: Systems thinking, K2-5: Use of technology, K3-1: Applied academic skills, and K3-2: Critical thinking skills.

Description of Employability Skills Reinforcement Data

The variable on employability skills reinforcement of the teacher candidates at vocational school was revealed by the questionnaire. The questionnaire consisted of 30 items in a scale of four (4). The minimum score was 30, the maximum score was 120. Therefore, the mean criteria ($\bar{X}k$) was 75. The results of the research data showed that the minimum score of the employability skills reinforcement was 68, the maximum score was 101, mean score was 90.49 , median score was 92.0, mode was 95, and the standard deviation was 5.71. The percentage of employability skills of students as the vocational teacher candidates in Automotive Engineering Education which were categorized as low was 0.83, the moderate category was 6, 67%, higher category was 73.33%, and 19.17% was on the very high category.

If it is classified, the data for strengthening employability skills for prospective vocational teachers in each component, i.e. (1) *Effective Relationships* (K1), (2) *Workplace Skills* (K2), dan (3) *Applied Knowledge* (K3). (Table 2)

Hypothesis testing

The SPSS output was a regression model: Y = 49.438 + 0. 445 X + ε, at the significance level α = 5%, the null hypothesis was rejected because the sig (0,000) < α (0.05). It can be concluded that the variable X 'learning with a scientific approach' had a significant effect on Y 'the reinforcement of the employability skills of vocational schools teacher candidates'.

F test (model fitness test)

By using SPSS ANOVA, Conclusion on the significance level of 5%, HO was rejected, because the value of sig (0.000) <α (0.05), then the model was fit.

The coefficient of determination (R^2) and correlation coefficient (R)

Correlation coefficient was R = 0, 476 means that there is a relationship between the implementation of scientific approach learning process during electrical in car body and air conditioning systems and employability skills reinforcement on vocational school teacher candidates vocational school teacher candidates in automotive engineering program with valid and reliable indicators of 22.7 % . The coefficient of Determination value (R Square) was 0,22. Therefore, the contribution of the scientific approach implementation in reinforcing the employability skills was 22.0 %, while the remaining percentage of 78 % is influenced by other factors.

DISCUSSION

Learning Planning

Lecturers developed a semester learning plan (RPP) with employability skills. The semester learning plan with employability skills was written through the formulation of learning objectives, the selection of learning method, the development of learning scenarios, and the development of learning instruments with employability skills. The formulation of learning objectives was performed by including the employability character indicators and audience, behavior, condition, degree *(ABCD)* components.

The learning material on car body's electrical system practice was a module which contained the flow diagram on the learning material; electrical lighting systems; central lock; power window; and door lock. The vocational teacher candidates read and understood the flow chart carefully, recognized the characteristics of the car body's electrical system, performed trouble shooting, and repaired the possible damages. In this example, vocational teacher candidates read and understood the images carefully was one formulation of communication skills from employability skills as intended by *BCA / ACCI, 2002*. The learning method with employability skills can be selected from a variety of learning methods that have the main characteristics to make students active in learning process. Therefore, in addition to being effective in achieving hard skills competencies, the vocational school candidate can also strengthen their employability skills. .

Learning scenarios for *employability skills* were developed from pre-selected learning method such as; the group work method, the project method, and the discussion. Learning scenarios in the form of lecturer teaching activities and learning activities of prospective vocational teacher were organized in the stages of opening activities, core activities, and closing learning activities. The learning assessment was developed in the form of a booklet test to assess cognitive knowledge, observation sheets to observe the behavior (employability skills) of the vocational teacher candidate, and self-evaluation sheet to allow any prospective vocational teachers reported learning activities related to the development of their employability skills.

Learning Implementation

The scientific approach to learning is similar with the scientific method, or the scientific model commonly used in science learning (Longbotham & Longbotha, 2006; and Keyes, 2010). Implementation of scientific approach was carried out by applying these following steps: Observing, Questioning, Gathering information / experimenting, Associating / processing information, Communicating (5M) as shown in Figure 2.

The implementation of a scientific approach to learning can strengthen the employability skills of vocational teacher candidates in the Automotive Engineering Education study program. The learning process was carried out in these stages; (1) group learning made the vocational teacher candidates felt more confident and comfortable; (2) the stages of observing strengthened them to be more motivated and increase their curiosity; (3) the stage of experimenting / gathering information made vocational teacher candidates more comfortable to gather information that can be performed together, exchanged ideas and experiences; (4) stages of associating, adding breadth and depth to information by processing information by seeking solutions from various sources; (5) communication stage, vocational teacher candidates were trained to convey the results of learning by reporting and presenting to the class. This is in line with the integrated productive practice management model (momantikproter) developed by Hadromi (2015). Hadromi (2015) argued that the application of momantikproter provides opportunities for teaching staff; participants learned to have an integral understanding of practice material, and have implications for increasing motivation to optimize their potential. These steps are steps in strengthening the employability skills of vocational teacher candidates.

The results showed that scientific approach learning had a significant effect on the strengthening of employability skills of prospective vocational teachers (table 2). The contribution of scientific approach to strengthen employability skills was 22.0%. This is possible because the scientific approach to learning involves vocational teacher candidates directly to associate learning material in real life contexts (In'am & Hajar, 2017). The association of the lessons with real life context in learning makes vocational teacher candidates more creative, innovative, and are able to bring out brilliant ideas in solving problems they face (Bandaranaike, 2018). It appears that as the children had more time to engage with the material, participate in cooperative peer discussions, and receive encouragement from their teachers to provide elaborated

feedback to each other (Gillies, 2015), so that it could strengthen the employability skills of vocational teacher candidates.

The sequence of employability skills components from the largest to the smallest is as follows: K2-4, K2-3, K1-1, K2-2, K2-1, K1-2, K2-5, K3-2 and K3-1. This data reveals that strengthening Workplace Skills (K2) and Effective Relationships (K1) are spread evenly at high levels, while the Applied Knowledge (K3) component is spread at lower level. The scientific approach is able to create an atmosphere of active learning, and can make students more creative and innovative in learning the material (Sodik & Wijaya, 2017) supports that the scientific approach in learning process can make the learning atmosphere active and very interesting, because students are confronted with the reality of the material and the facts in their surrounding to increase their motivation to find out more.

Learning Assessment

The implementation of the scientific approach required understanding and creativity of the lecturer in presenting the material with the scientific approach. Scientific approach has advantages and disadvantages. One of the strengths of the scientific approach is that it creates an enjoyable learning situation (Putra et al. 2020). The lecturer need to pay attention to several factors that influence the success of the learning process. The success of the teaching and learning process is influenced by: (1) the self of vocational teacher candidates as the main actors in the teaching and learning process, (2) the lecturer himself as the manager of the teaching and learning process with all its uniqueness, (3) the educational objectives which are the targets of achievement of the teaching and learning process, (4) learning materials as the main supporting material for the achievement of objectives, (5) ease of accessing teaching material resources, (6) the atmosphere of learning. From all the descriptions, the lecturer is one of the components that greatly determines the success of vocational teacher candidates in learning and strengthening employability skills . Therefore, lecturers must always try and innovate to find the appropriate strategies, methods, models and approach in learning (Sumayasa, 2015).

Through learning wit scientific approach, professor, lecturer and teaching staff become the learning facilitators so that the learning process can take place more effectively to improve the knowledge, skills and attitudes. Darling-Hammond (2015) corroborates that to realize students' cognition requires the teaching of broad skills from the teaching staff. In addition, Orlich et al. (2012) believes that good teaching staff reflects the way in which they will present their lessons and through their education, having various teaching strategies at their disposal (Irmita & Atun, 2018).

CONCUSIONS

Effective teaching not only involves the use of tools, techniques, and strategies but also the understanding of meaning specifically about how vocational teacher candidates learn, process information, motivate themselves, and pay attention inhibiting

factors in learning. Scientific approach is a learning method that regulates learning in stages that contain instructions for conducting learning to vocational teacher candidates. The application of scientific approach can strengthen the employability skills of vocational teacher candidates. This condition is possible because learning is carried out with the scientific stages. This implementation of the scientific approach in learning could strengthen employability skills with the percentages as follows: the medium category by 6.67%, the high category by 73.33%, and 19.17% in the very high category. The amount of contribution in strengthening employability skills was 22.0%. The application of learning strategies with the scientific approach specifically strengthens employability skills in the components as follows: Workplace Skills (K2) and Effective Relationships (K1) components that spread evenly at high levels of reinforcement, while the Applied Knowledge (K3) component is at a moderate level of reinforcement.

SUGGESTION

The results of this study for educational institutions can enrich the reference of educational institutions in constructing curricula and developing lesson plans to implement the scientific approach to learning. This study revealed that university curricula must be redesigned with more direct industry internships and projects, which could facilitate pre-employment training and improve employment capacity of the graduates

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Lampiran 15. Balasan iji bahwa artikel sudah diterima dan akan kirim ke evaluator.

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Amendments

iji@ogu.edu.tr <iji@ogu.edu.tr> Tue, Apr 7, 2020 at 10:33 PM
To: hadromi <hadromi@mail.unnes.ac.id>, drsudarman@mail.unnes.ac.id, heri_yudiono@mail.unnes.ac.id, febrian.arif.budiman@mail.unnes.ac.id, khoerulpermana123@gmail.com, mnurkholismadjid@gmail.com

Dear author

We received your revised article, fixed again and sent it to reviewers. Thank you very much for your interest in IJI.

Sincerely yours,
Editorial
International Journal of Instruction

From: "hadromi" <hadromi@mail.unnes.ac.id>
To: "iji" <iji@ogu.edu.tr>
Sent: Sunday, April 5, 2020 10:27:13 AM
Subject: Re: Amendments
[Quoted text hidden]

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Lampiran 16. Email Tgl 24 April 2020 (Permohonan dari iji untuk merefisi kembali/yang ke-2)

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minor amendments

5 messages

iji@ogu.edu.tr <iji@ogu.edu.tr> Fri, Apr 24, 2020 at 9:56 PM
To: hadromi@mail.unnes.ac.id, drsudarman@mail.unnes.ac.id, heri_yudiono@mail.unnes.ac.id, febrian.arif.budiman@mail.unnes.ac.id, khoerulpermana123@gmail.com

Dear author

You have minor amendments from a reviewer. Could you please amend **on attached file "Article 050220_revised_for revision"** and send back your revised article and the list of explanations of the revisions done via e-mail (iji@ogu.edu.tr) as an attached file as soon as possible? ***mnurkholismadjid@gmail.com*** is not valid, could you send a valid email?

Sincerely yours,
Editorial
International Journal of Instruction

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Lampiran 17. Lembar hasil evaluator artikel (Email 24 April 2020)

International Journal of Instruction Article Evaluation Form

Mr. /Mrs.

It is to acknowledge you that the Executive Committee of *International Journal of Instruction* has decided that the article mentioned below would be reviewed by you. Thank you very much for your contributions.

Asım ARI
Editor in Chief

Name of the article: The Learning Strategy Based on Scientific Approach to Strengthen the Employability Skill of Teacher

After reviewing the attached article, please read each item carefully and select the response that best reflects your opinion. To register your response, please **mark** or **type in** the appropriate block.

	Yes	Partially	No
Do you think the title is appropriate?	☐	☒	☐
Does the abstract summarize the article clearly and effectively?	☐	☒	☐
Are the objectives set clearly?	☐	☒	☐
Is the issue stated clearly?	☒	☐	☐
Is the literature review adequate?	☐	☒	☐
Is the design of the research appropriate, and the exemplary, if any, suitable?	☐	☒	☐
Is the methodology consistent with the practice?	☐	☒	☐
Are the findings expressed clearly?	☒	☐	☐
Is the presentation of the findings adequate and consistent?	☐	☒	☐
Are the tables, if any, arranged well?	☐	☒	☐
Are the conclusions and generalizations based on the findings?	☐	☒	☐
Are the suggestions meaningful, valid, and based on the findings?	☒	☐	☐
Are the references adequate?	☐	☐	☒
Is the language clear and understandable?	☐	☒	☐
Is cohesion achieved throughout the article?	☐	☒	☐
Is the work contributing to the field?	☐	☒	☐

Evaluation:

- ☐ The article can be published as it is.
- ☒ The article can be published after some revision.
- ☐ The article must undergo a major revision before it can be resubmitted to the journal.
- ☐ The article cannot be published.

Would you like to see the revised article if you have suggested any revisions? ☒ Yes ☐ No

Please write your report either on this paper or on a spare paper.

REPORT

Section of the Manuscript	Comments and Notes
Title- Abstract-Summary	Where is the conclusion?
Introduction and Literature Review	1. Add 5 references to support this statement 2. Add details information about top 10 skills 3. Add more state of the art from 10 article International Journal Q1-Q3 more details information in attached file

.

Research Methods	1. Why use this purposive sampling? Explain further 2. Add references for this statement
Research Findings	Add table for result of your statistic test
Discussion	1. Add 5 references to this paragraph 2. This sentences mention in method 3. Why can strengthen employability? 4. Insert your argumentation with relevan references 5. Please don't mention procedure of your research in discussion section 6. is teaching staff as a lecture too? 7. Explain further why teaching staff include a facilitators more details information in attached file
Conclusion and Suggestions	good
References and Citation	Add references
Language	pk again on typo word
Other issues	

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Lampiran 18. Daftar perubahan/revisi draf artikel (email 24 April 2020)

The following changes have been made on the Manuscript "…" in accordance with reviewers' comments

Reviewer's comments	Changes made	Page (see highlights)

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Lampiran 19. Jawaban kesediaan memperbaiki artikel, dan mengirim hasil perbaikian artikel dari penulis ke IJI.

Hadromi Unnes <hadromi@mail.unnes.ac.id> Sat, Apr 25, 2020 at 12:05 AM
To: International Journal of Instruction <iji@ogu.edu.tr>
Cc: drsudarman@mail.unnes.ac.id, heri_yudiono@mail.unnes.ac.id, febrian.arif.budiman@mail.unnes.ac.id, khoerulpermana123@gmail.com

Thank you for your email.

Best regards
Hadromi
[Quoted text hidden]

Hadromi Unnes <hadromi@mail.unnes.ac.id> Sun, Apr 26, 2020 at 11:29 AM
To: International Journal of Instruction <iji@ogu.edu.tr>

Dear International Journal of Instruction (IJI)

I submit the results of the revised article entitled 'The Learning Strategy Based On Scientific Approach To Strengthen The Employability Skill Of Teacher', No. 050220 in this email attachment,
I hope for you to be able to receive

thank you

Best regards,
Hadromi.
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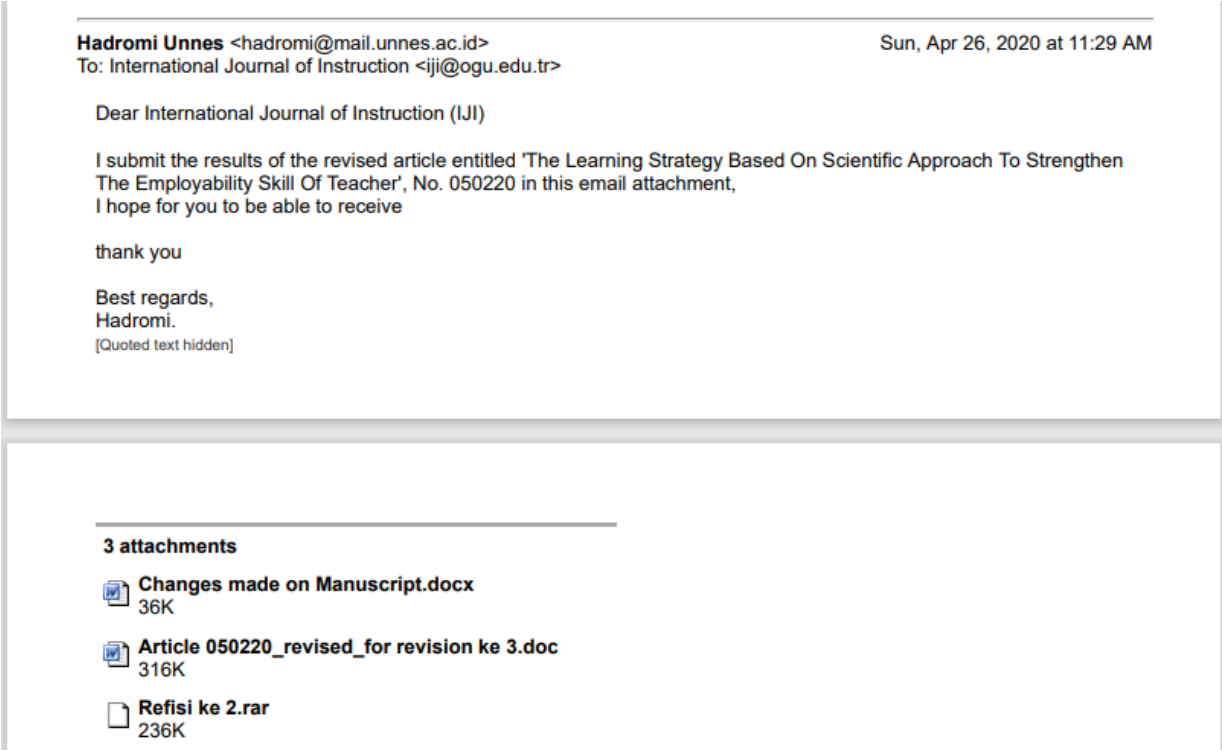
Lampiran 20. Submit hasil revisi dari penulis: Penulis



Hadromi Unnes <hadromi@mail.unnes.ac.id> Sun, Apr 26, 2020 at 11:29 AM
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thank you

Best regards,
Hadromi.
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3 attachments

Changes made on Manuscript.docx
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Article 050220_revised_for revision ke 3.doc
316K

Refisi ke 2.rar
236K

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Lampiran 21. Isian form hasil refisi pada artikel ke -2a

The following changes have been made on the Manuscript "…" in accordance with reviewers' comments

Reviewer's comments	Changes made	Page (see highlights)
Title- AbstractSummary		
Where is the conclusion?	The reinforcement of employability skills vocational teacher candidates resulted in the reinforcement of the competitiveness of prospective graduates. When they have become vocational teachers, they are able to produce competitive vocational school graduates in 4.0 industry era.	Lines: 15-19, page: 1
Introduction and Literature Review		
Add 5 references to support this statement Add details information about top 10 skills Add more state of the art from 10 article International Journal Q1-Q3 more details information in attached file	1. Gray, (2016). 2. Autor, Levy, & Murnane, 2003; 3. Burrus, Jackson, Xi, & Steinberg, 2013; 4. Levy & Murnane, 2005; 5. Neubert, Mainert, Kretzschmar, & Greiff, 2015). 6. Binkley et al., 2012.	Lines: 1-9 Page 4.
Research Methods		
Why use this purposive sampling? Explain further, Add references for this statement	1. Tongco, 2007. 2. Karmel & Jain, 1987	Line 1-3 Page: 6
Research Findings		
Add table for result of your statistic test	Table 3, The coefficient of determination and correlation	Page 10
Discussion		
Add 5 references to this paragraph	1. Stephenson & Sadler-McKnight (2016). 2. Rosenberg, et al, (2012), " 3. Camuffo, et al. (2020). 4. Lyubomirsky, S. (2008). 5. Wieman, (2007).	Page 12, 13

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Lampiran 2: Draf article hasil refisi

The Learning Strategy Based On Scientific Approach To Strengthen The Employability Skill Of Teacher

The preparation of Vocational School teacher candidates who have technical skills and employability skills begins with the learning process. This paper aims to formulate learning strategies based on scientific approach to strengthen employability skills for vocational school teacher candidates. This study employed a quantitative approach with a non-experimental survey design. The samples in the study consisted of 120 vocational teacher candidates in the Automotive Engineering Education Program, Faculty of Engineering, Semarang State University (UNNES) who took car body's electrical system practice course. Research data were collected with test questions, observation sheets and questionnaires. The research data were analyzed using descriptive analysis, regression analysis. Data analysis was performed with the help of SPSS software version 20.0 for windows. The results showed that the implementation of learning strategies with scientific approach significantly strengthen employability skills of vocational teacher candidates with a contribution of 22.0%, while the remaining 78% was influenced by other factors. The reinforcement of employability skills vocational teacher candidates resulted in the reinforcement of the competitiveness of prospective graduates. When they have become vocational teachers, they are able to produce competitive vocational school graduates in 4.0 industry era.

Keywords: learning strategies, scientific approach, employability skills, vocational school, teacher candidates

INTRODUCTION

Vocational Education and Technology Institutions (VETIs) are educational institutions with the same level of university which are responsible for educating teacher candidates. Automotive Engineering Education Program at the Faculty of Engineering, Semarang State University is a VETI that produces vocational school teacher candidates in the expertise of Automotive Engineering. Professors, lecturers, and education staffs are expected to conduct a learning process that is responsive to social roles and changes in job skills in the workplace so learners can succeed in the workplace (Hounsell, 2011).

The challenge of VETIs graduates is that the workplace demands graduates with high competition (High Fliers, 2018), VETI is challenged to create outstanding graduates who are best suited for work, innovative, creative (Motallebzadeh et al. 2018). The industrial era 4.0 has induced changes in occupational skills at the workplace (Hamill, 2018). The impact of changes at the workplace in the industrial era 4.0 led to several changes in VETI so that the graduates remain relevant according to market needs and are ready to work. There are 10 top skills required in 2020 (Gray, 2016). Furthermore, Wagner emphasized that in entering the "occupational world" in the 21st century, seven survival skills are required: (1) critical thinking and problem solving; (2) collaboration across networks and leading by influence;(3) agility and adaptability; (4) initiatives and entrepreneurship; (5) effective oral and written communication; (6) accessing and analyzing information; and (7) curiosity and imagination (Wagner,

2010). Performance of professors, lecturers, and education staffs are influential in producing competencies and the formation of character, mentality and mindset of students (Lapsley & Ryan, 2016). The learning process is expected to develop exceptional human resources, skilled and have high skill (Orlich et al. 2012).

In Indonesia, the Ministry of Research, Technology and Higher Education (Ristekdikti) pays serious attention to VETIs to be able to produce competent teachers with good character and have high employability skills. However, the weak employability skills from VETI graduates who work as teachers both in public schools and in vocational schools, and working in the industry are often highlighted. The graduates of secondary vocational schools, diplomas and higher education are still less competent in terms of: (1) oral and written communication, (2) critical thinking and problem solving, (3) work ethics and professionalism, (4) working in teams and collaborating, (5) working in different groups, (6) using technology, and (7) project management and leadership (Trilling & Fadel, 2009). Those seven components are based on the study of Trilling and Fadel (2009). They are basic skills that every teacher candidates are required to adapt to the workplace.

The employability gap is observed by studies in various parts of the world, including Australia (Evans-Greenwood et al. 2015); India (Smith & Edwards, 2012); Malaysia (Singh & Singh, 2008); Uzbekistan (Ajwad et. al. 2014) and Pakistan (Mirza et al. 2014) found that a major problem in India is the employability skills of labor. In Australia, 22.4% of health entrepreneurs face difficulties in recruiting graduates with the appropriate skills (Messum et al. 2015). A total of 64% engineering entrepreneurs in India stated that they are only 'somewhat satisfied' with the recruitment of new workers (Messum et al. 2015. In Uzbekistan, entrepreneurs reported problems in recruiting employees with the appropriate number of skills reaching only 73% (Ajwad et al. 2014).

Based on these reviews, the efforts to reinforce the employability skills for students as teacher candidates start from the reinforcement of vocational institutions graduates. Especially if it is associated with VETIs as institutions which produce vocational school teachers, the position of employability skills is increasingly strategic to be reinforced in the learning process in VETIs.

This paper aims to formulate a learning strategy with a scientific approach to strengthen employability skills of the vocational teacher candidates. Although, it is recognized that competencies and skills are complex and challenging to learn, the vocational teacher candidates find it difficult to develop employability skills unless they are explicitly taught. Complex competencies and skills must be developed integrated with learning and not with individual learning (Hadromi, 2018)

Employability skills

Employability skills are main skills, soft skills, generic skills, main competencies, transferable skills or personal attributes (Messum et al. 2015). Employability skills as skills which are required not only to get a job, but also for the progress of the company and the workforce can contribute well for the company (Messum et al. 2015).

Employability skills are general and non-technical competencies required to do all types of work.

According to the results of a study by the American Institutes for Research (2016), employability skills that can be taught through education and workforce development systems, are divided into three broad categories; (1) Effective Relationship, the interpersonal skills and personal qualities that enable individuals to interact effectively with clients, coworkers, and supervisors; (2). Workplace Skills, the analytical and organizational skills and understanding required by employees to successfully perform work tasks; (3). Applied Knowledge, the integration of academic knowledge and wise technical skills, put to practical use in the workplace. (table 1).

Employability skills have three main parameters, namely: 1) basic skills: communication skills, information management skills, problem solving skills; 2) self-management skills: skills in demonstrating positive attitudes and behavior, responsible skills, adaptive skills, continuous learning skills, safe work skills; and 3) teamwork skills: skills in working with others in the team, skills in participating in a project or task.

Table 1
Components of employability skills

Skill	Code	Criteria	Including
Effective Relation-ships (K1)	K1-1	Interpersonal skills	Understand teamwork and work with others; respond to customers' needs; leadership training; negotiations to resolve conflicts; respecting individual differences.
	K1-2	Personal quality	Demonstrating responsibility and self-discipline; adapt and show flexibility; work independently; demonstrating a desire to learn; demonstrating integrity; demonstrate professionalism; take the initiative; display a positive attitude and sense of self-worth; assume responsibility for professional growth.
Workplace Skills (K2)	K2-1	Resource management	Time management: manage money; managing ingredients; arrange personnel.
	K2-2	The use of information	Placing information: organize information; use information; analyze information; communicating information.
	K2-3	Communication skills	Communicate verbally: active listening; understand written material; convey information in writing; observe closely.
	K2-4	Systems thinking	Understand and use the system; monitor the System; improve the system
	K2-5	Use of technology	Skills in using various technologies
Applied Knowledge (K3)	K3-1	Applied academic skills	Using reading skills; use writing skills; use mathematical strategies and procedures; using scientific principles and procedures.
	K3-2	Critical thinking skills	Critical thinking; creative thinking; make good decisions; solve the problem; reason; plan and organize.

(Adopted from: American Institutes for Research. 2016)

The top 10 skills that are expected to be essential in 2020 include skills like problem-solving, critical thinking, creativity, people management, and coordination. (Gray, 2016). The twenty-first century has reshaped the world in unimaginable ways. Computers and IT have revolutionized the skills needed by a twenty-first century worker (Burrus, Jackson, Xi, & Steinberg, 2013; Levy & Murnane, 2005; Neubert, Mainert, Kretzschmar, & Greiff, 2015). The Assessment & Teaching of twenty-first Century Skills (ATC21S) (Binkley et al., 2012) identified limited but essential skills such as, problem-solving, critical thinking, decision-making, collaboration, and innovation (Javed et al, 2019)

The core of the learning approach based on scientific approach

The scientific approach is a series of processes for answering questions (Prayogi & Yuanita, 2018). Through the thought process, the hypothesis is proposed to be a temporary answer to the question, which has been posed (Putra et al. 2020). The scientific approach as a scientific process consists of six steps: (1) posing the problem, (2) formulating hypotheses, (3) designing an experiment, (4) making observation, (5) collecting data from the experiment, and (6) drawing conclusions ((Prayogi & Yuanita, 2018). scientific approach is a method to generate and answer scientific questions through observation and or experimentation.

Professors, lecturers, and educational staff of vocational subjects must be able to design learning process that can develop cognitive skills, technical skills, and soft skills in the form of employability skills simultaneously. Preparation of vocational school students who have academic skills, technical skills and employability skills stems from the education process of vocational school teacher candidates (Hadromi, 2018), A study conducted by (Prayogi & Yuanita, 2018). (2018) showed that the learning process carried out by vocational teacher education institutions emphasizes on the increasingly strong employability skills of vocational teacher candidates.

The core of learning scientific approach aims to gain scientific knowledge systematically. The scientific approach is rooted in the scientific approach, a concept that emphasizes the process of gaining scientific knowledge. Scientific approach are procedures or processes that prioritize more active and participatory methods (Simonneaux, 2014). This kind of learning strategy can support students to develop hands-on and mind-on and develop students' basic abilities such as communication, interpersonal relationships, critical thinking, and problem solving skills (Lazanyi, 2012). This was confirmed by Prain (2012) who argued that to compete in the 21st century, the young generation must at least have the following abilities; communication skills, interpersonal relationships, critical and rational thinking, problem solving, risk taking, cooperative skills, innovative skills, leadership, and technology.

Scientific approach learning strategies

The application of a scientific approach to learning is basically guided by the characteristics of the scientific approach that is transformed in the steps of learning process. Steps in applying the scientific approach according to Ryan and O'Callaghan

(2018) include five steps as follows. STEP 1: Make an OBSERVATION - gather and assimilate information about an event, phenomenon, process, or exception to a previous observation, etc. STEP 2: Define the PROBLEM - ask questions about the observation that are relevant and testable. Define the null hypothesis to provide unbiased results. STEP 3: Form the HYPOTHESIS - create an explanation, or educated guess, for the observation that is testable and falsifiable. STEP 4: Conduct the EXPERIMENT - devise and perform an experiment to test the hypothesis. STEP 5: Derive a THEORY - create a statement based on the outcome of the experiment that explains the observation (s) and predicts the likelihood of future observations.

In line with Ryan and O'Callaghan (2018), the Minister of Education and Culture Regulation Number 22 Year 2016 states that learning steps with a scientific approach include observing, asking, experimenting, reasoning (associating), concluding, and communicating (forming networks). These five steps are known as 5M. The scientific approach is included in the student-centered approach, because in the process, it prioritizes active students in the learning process and the teacher acts as a facilitator.

In the learning process based on a scientific approach, the domain of attitude observes the transformation of learning substance or teaching material so that students "know why." The realm of skill is observing the transformation of learning substance or teaching material so that students "know how". The realm of knowledge observes the transformation of learning substance or teaching material so that students "know what." The result is an increase and balance between the ability to be good human beings (soft skills) and people who have the skills and knowledge to live properly (hard skills) from students who includes aspects of competence, attitudes, skills, and knowledge.

RESEARCH METHODOLOGY

Research design

This study employed a quantitative approach with a non-experimental survey because the study investigated sample data obtained from the population and used a questionnaire as a data collection instrument (Sund & Leslie 1973). The study aims to determine (1) the characteristics of the scientific approach implementation and employability skills variables, (?) confirm whether the indicators of the scientific approach implementation influence the reinforcement of employability skills, and (3) determine the contribution of the scientific approach implementation to reinforcing employability skills. The implementation of the scientific approach as an independent variable, and employability skills as a dependent variable.

Population and samples.

The research population consisted of 450 students of Automotive Engineering Education Program, Mechanical Engineering Department, Faculty of Engineering, Semarang State University. Furthermore, the sample of this study was determined using a purposive sampling technique. The purposive sampling technique is a type of non-probability sampling that is most effective when one needs to study a certain cultural domain with knowledgeable experts within, Three categories: Studies of specific skills, knowledge, or practices; Comparisons between practices; and Case

studies (Tongco, 2007; Karmel & Jain, 1987). Sampling was based on on consideration by involving the third semester students and the students who joined program car electrical system course, and AC systems with a total of 120 students.

Research instrument

The research instrument consisted of (1) scientific approaching learning instruments, (2). The instrument for the employability skills reinforcement of vocational school teacher candidates. The instruments used in learning activities have scientific approaches consisting of syllabus, lesson plans, practice sheets . The instrument was validated by two vocational education experts and two education practitioners (the lecturers of Automotive Engineering Education Program). Validation was performed by giving scores for each component on the validation sheet with a score range of 1 - 4. Score 1 indicates "invalid," 2 indicates "somewhat valid," 3 indicates "valid," and 4 indicates "highly valid." Data analysis from the results of validation was conducted by calculating the average score from experts and practitioners. Validation results showed the following scores: 3, 62 (valid) for syllabus, 3.68 (valid) for lesson plans, 3.70 (valid) for job sheets. Furthermore, the instrument for the scientific approach implementation and employability skills reinforcement consists of 30 questions each. The instruments were validated by using SPSS version 20.0 for windows. The value of Person Correlation for each instrument was between 0.438 to 0.519, and 0.410 to 0, 547 with valid category.

Reliability tests were also conducted on instruments to measure scientific approach implementation, and employability skills reinforcement. Reliability testing involved 54 students who were asked to complete 30 questions that had previously been validated. A score of 54 students was then tested using Cronbach's alpha with the help of Statistical Package for Social Sciences (SPSS) version 20.0 for Windows. Reliability test showed that the Cronbach's alpha value for the scientific approach implementation was 0.747, and 0,791 for the employability skills reinforcement. Both values were greater than 0.6. Therefore, both instruments were considered reliable. Both instruments for scientific approach implementation and employability skills reinforcement were valid and reliable to be used to collect research data

Data analysis

Data in this study were tested for their for homogeneity, normality and linearity before they were analyzed using descriptive analysis, regression analysis. The data analysis of the data was performed with the help of SPSS version 20.0 for Windows. The application of descriptive analysis was conducted to determine the variable characteristics of the scientific approach implementation and employability skills reinforcement. The regression analysis was used to determine the influence and contribution of the scientific approach implementation to employability skills reinforcement.

Prerequisite test

The prerequisite test which was performed before regression analysis consisted of homogeneity test, normality test, and linearity test. The data homogeneity test results

with α: 0,5 with numerator df (n-1, where n = 120), and denominator df (n-1, with n equal to 120) showed F stat: 1.146, and F table : 1.35 . Because F count < F table, then the data had the same variance (homogeneous).

The results of normality test data using Kolmogorov-Smirnov showed the Sig. Kolmogorov Smirnov = 0.200>α = 0.05, the conclusion is that the data on scientific approach implementation and employability skills are normally distributed. The linearity test results showed the F value was fit (Deviation from linearity is 1.145 with significance 0.311 above 0.05) so that linearity requirements were met.

Stages Of Learning With Scientific Approach

Planning

The planning stage of learning process with employability skills reinforcement for vocational school teacher candidates was conducted in the following steps;

1. The lecturer prepared the learning documents; semester learning plan (RPS); teaching materials, learning media.
2. The lecturer chose a car body's electrical system practice course that was used in conducting research.
3. Vocational teachers and prospective teachers understood the curriculum that strengthens the mutually agreed employability skills of vocational teacher candidates.
4. The vocational school teacher candidate understood the competencies that was applied in learning according to the content of the Automotive Engineering Education Study Program's Curriculum.
5. In this context attitude / affective indicators are taken from the formulation of *employability skills* that already exist in the curriculum consisting of *Effective Relationships* (K1) , *Workplace Skills* (K2) , and *Applied Knowledge* (K3)
6. The selection of the value of employability skills to be developed in vocational school teacher candidates is used as a basis for determining learning and assessment activities.
7. Prepared the assessments; test questions, questionnaires, and observation sheets.

Implementation

The learning process which used the scientific approach was carried out in three stages: (1) preliminary activities; (2) core learning activities; and (3) closing activities. Preliminary activities were carried out by giving orientation to vocational school teacher candidates about the learning material to be delivered, it was continued to provide motivation, apperception, giving references.

The core learning activities were carried out according to the steps of the scientific approach including observing, questioning, experimenting, reasoning (associating), concluding, and communicating (5M) (Utanto et al. 2017) . 5M was applied using ICT-based media and applied the learning technique / method based on students' activities that are fully illustrated in Figure 1.

Closing activities were carried out by (1) making a summary / conclusion of the lesson by involving the teacher candidate; (2) checking the completion of the tasks; (3) providing feedback and direction / motivation; (4) Delivering follow-up on learning and remedial/enrichment services; (5) Informing the material / tasks of the next meeting; (6) closing the lesson with greetings

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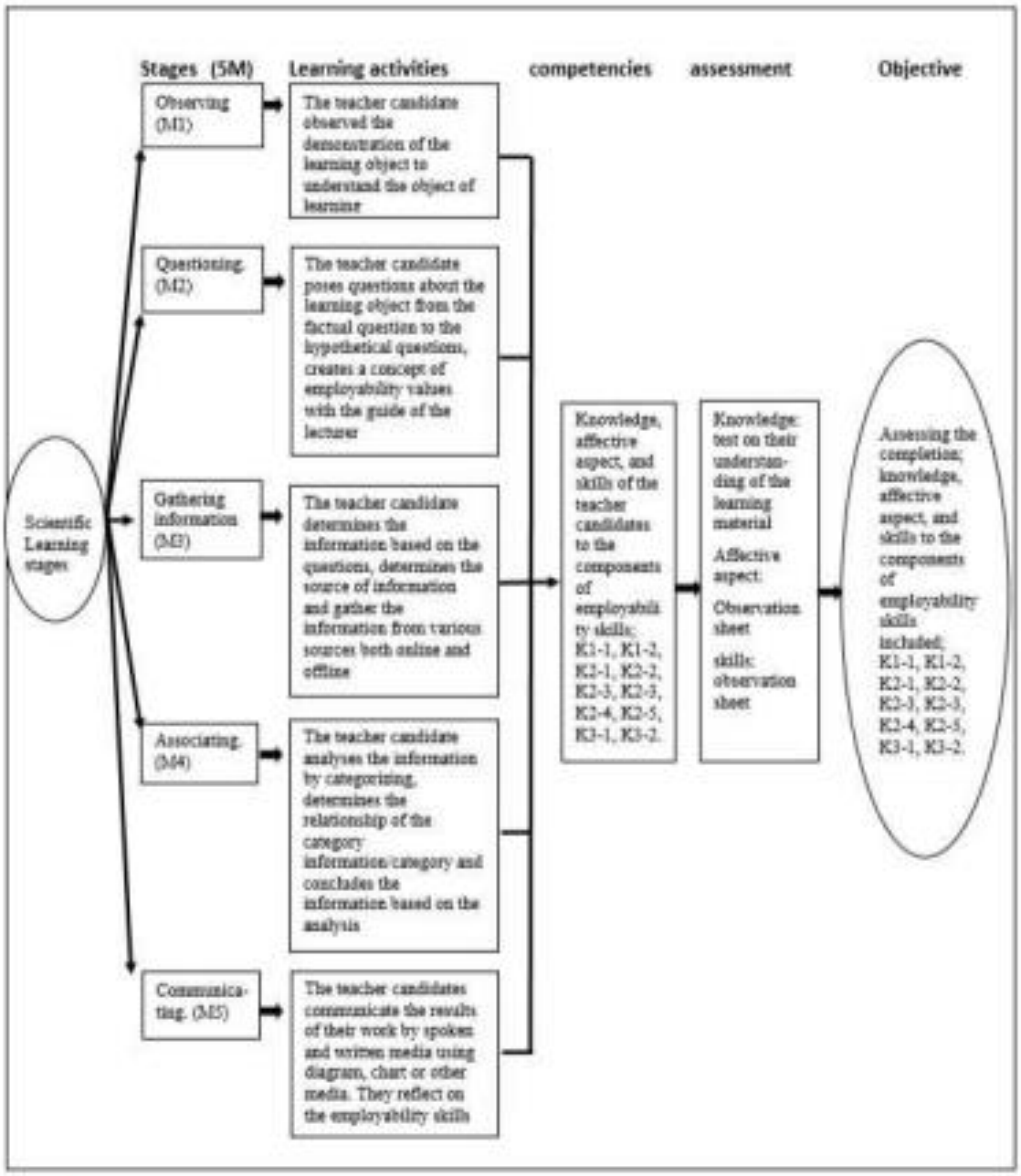

Figure 1
The stages of the implementation of learning process with a scientific approach

FINDINGS

The Description of Scientific Approach Implementation Data

The data on the implementation of scientific approach were revealed by questionnaire consisting of 30 items in the four scale (1 - 4). A minimum score for the scientific approach implementation variable was equal to 30, the amount of the maximum score was 120, and the mean criterion *(X ˜ k)* was 75. The results of the research data showed

that the minimum score was 74, the maximum score was 108, the mean score was 92.26, the median score was 92, the mode was 95, and the standard deviation was 6.15. By using the mean score of the criteria ($\bar{X}k = 75$), The mean score of the research data was 92.56 ($\bar{X} = 92.56$). In general, all students in Automotive Engineering Education Department, Faculty of Engineering, Semarang State University perceived the implementation of scientific approach in electrical and air conditioning systems were categorized as very high. Only 6.67 % of students perceived the implementation of the scientific approach in the moderate category, 74.17 % in the high category, 19.16 % in the very high category.

Table 2
Data on strengthening of vocational teacher candidtes' employability skills

Komponen	Effective Relationships (K1)		Workplace Skills (K2)					Applied Knowledge (K3)	
	K1-1	K1-2	K2-1	K2-2	K2-3	K2-4	K2-5	K3-1	K3-2
Sum	412.0	391.0	393.0	402.0	423.0	462.0	386.0	344.0	378.0
Max	5.0	5.0	5.0	5.0	5.0	6.0	5.0	5.0	5.0
Min	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Average	3.4	3.3	3.3	3.4	3.5	3.9	3.2	2.9	3.2
Median	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Mode	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Stdev	0.6	0.7	0.7	0.7	0.8	0.9	0.8	0.7	0.9
Varians	0.4	0.5	0.5	0.5	0.7	0.7	0.6	0.6	0.8

Note: K1-1: Interpersonal skills, K1-2: Personal quality, K2-1: Resource management, K2-2: The use of information, K2-3: Communication skills, K2-4: Systems thinking, K2-5: Use of technology, K3-1: Applied academic skills, and K3-2: Critical thinking skills.

Description of Employability Skills Reinforcement Data

The variable on employability skills reinforcement of the teacher candidates at vocational school was revealed by the questionnaire. The questionnaire consisted of 30 items in a scale of four (4). The minimum score was 30, the maximum score was 120. Therefore, the mean criteria ($\bar{X}k$) was 75. The results of the research data showed that the minimum score of the employability skills reinforcement was 68, the maximum score was 101, mean score was 90.49 , median score was 92.0, mode was 95, and the standard deviation was 5.71. The percentage of employability skills of students as the vocational teacher candidates in Automotive Engineering Education which were categorized as low was 0.83, the moderate category was 6, 67%, higher category was 73.33%, and 19.17% was on the very high category.

If it is classified, the data for strengthening employability skills for prospective vocational teachers in each component, i.e. (1) *Effective Relationships* (K1), (2) *Workplace Skills* (K2), dan (3) *Applied Knowledge* (K3). (Table 2)

11

Hypothesis testing

The SPSS output was a regression model: $Y = 49.438 + 0.445 X + \varepsilon$, at the significance level $\alpha = 5\%$, the null hypothesis was rejected because the sig (0,000) < α (0.05). It can be concluded that the variable X 'learning with a scientific approach' had a significant effect on Y 'the reinforcement of the employability skills of vocational schools teacher candidates'.

F test (model fitness test)

By using SPSS ANOVA, Conclusion on the significance level of 5%, HO was rejected, because the value of sig (0.000) <α (0.05), then the model was fit.

The coefficient of determination (R^2)· and correlation coefficient (R)

Correlation coefficient was R = 0, 476 means that there is a relationship between the implementation of scientific approach learning process during electrical in car body and air conditioning systems and employability skills reinforcement on vocational school teacher candidates vocational school teacher candidates in automotive engineering program with valid and reliable indicators of 22.7 % (table 3). The coefficient of Determination value (R Square) was 0,22. Therefore, the contribution of the scientific approach implementation in reinforcing the employability skills was 22.0 %, while the remaining percentage of 78 % is influenced by other factors.

Table 3 The coefficient of determination and correlation

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.476[a]	.227	.220	5,053	.227	34,640	1	118	.000

a. Predictors: (Constant), Scientific approach

b. Dependent Variable: employability skills reinforcement

DISCUSSION

Learning Planning

Lecturers developed a semester learning plan (RPP) with employability skills. The semester learning plan with employability skills was written through the formulation of learning objectives, the selection of learning method, the development of learning scenarios, and the development of learning instruments with employability skills. The formulation of learning objectives was performed by including the employability character indicators and audience, behavior, condition, degree *(ABCD)* components.

The learning material on car body's electrical system practice was a module which contained the flow diagram on the learning material; electrical lighting systems; central lock; power window; and door lock. The vocational teacher candidates read and understood the flow chart carefully, recognized the characteristics of the car body's electrical system, performed trouble shooting, and repaired the possible damages. In this example, vocational teacher candidates read and understood the images carefully was one formulation of communication skills from employability skills as intended by *BCA / ACCI, 2002*. The learning method with employability skills can be selected from a variety of learning methods that have the main characteristics to make students active in learning process. Therefore, in addition to being effective in achieving hard skills competencies, the vocational school candidate can also strengthen their employability skills.

Learning scenarios for *employability skills* were developed from pre-selected learning method such as; the group work method, the project method, and the discussion. Learning scenarios in the form of lecturer teaching activities and learning activities of prospective vocational teacher were organized in the stages of opening activities, core activities, and closing learning activities. The learning assessment was developed in the form of a booklet test to assess cognitive knowledge, observation sheets to observe the behavior (employability skills) of the vocational teacher candidate, and self-evaluation sheet to allow any prospective vocational teachers reported learning activities related to the development of their employability skills.

Learning Implementation

The scientific approach to learning is similar with the scientific method, or the scientific model commonly used in science learning (Longbotham & Longbotha, 2006; and Keyes, 2010). Implementation of scientific approach was carried out by applying these following steps: Observing, Questioning, Gathering information / experimenting, Associating / processing information, Communicating (5M) as shown in Figure 2.

The implementation of a scientific approach to learning can strengthen the employability skills of vocational teacher candidates in the Automotive Engineering Education study program. The learning process was carried out in these stages; (1) group learning made the vocational teacher candidates felt more confident and comfortable; (2) the stages of observing strengthened them to be more motivated and increase their curiosity; (3) the stage of experimenting / gathering information made vocational teacher candidates more comfortable to gather information that can be performed together, exchanged ideas and experiences; (4) stages of associating, adding breadth and depth to information by processing information by seeking solutions from various sources; (5) communication stage, vocational teacher candidates were trained to convey the results of learning by reporting and presenting to the class. This is in line with the integrated productive practice management model (momantikproter) developed by Hadromi (2015). Hadromi (2015) argued that the application of momantikproter provides opportunities for teaching staff; participants learned to have an integral understanding of practice material, and have implications for increasing motivation to

optimize their potential. These steps are steps in strengthening the employability skills of vocational teacher candidates.

The results showed that scientific approach learning had a significant effect on the strengthening of employability skills of prospective vocational teachers (table 2). The contribution of scientific approach to strengthen employability skills was 22.0%. This is possible because the scientific approach to learning involves vocational teacher candidates directly to associate learning material in real life contexts (In'am & Hajar, 2017; Stephenson & Sadler-McKnight, 2016). The association of the lessons with real life context in learning makes vocational teacher candidates more creative, innovative, and are able to bring out brilliant ideas in solving problems they face (Bandaranaike, 2018). It appears that as the children had more time to engage with the material, participate in cooperative peer discussions, and receive encouragement from their teachers to provide elaborated feedback to each other (Gillies, 2015), so that it could strengthen the employability skills of vocational teacher candidates (Stephenson & Sadler-McKnight, 2016; Rosenberg et al, 2012).

The sequence of employability skills components from the largest to the smallest is as follows: K2-4, K2-3, K1-1, K2-2, K2-1, K1-2, K2-5, K3-2 and K3-1. This data reveals that strengthening Workplace Skills (K2) and Effective Relationships (K1) are spread evenly at high levels, while the Applied Knowledge (K3) component is spread at lower level. The scientific approach is able to create an atmosphere of active learning, and can make students more creative and innovative in learning the material (Sodik & Wijaya, 2017) supports that the scientific approach in learning process can make the learning atmosphere active and very interesting, because students are confronted with the reality of the material and the facts in their surrounding to increase their motivation to find out more.

Learning Assessment

The implementation of the scientific approach required understanding and creativity of the lecturer in presenting the material with the scientific approach. Scientific approach has advantages and disadvantages (Camuffo et al, 2020). One of the strengths of the scientific approach is that it creates an enjoyable learning situation (Putra et al. 2020; Lyubomirsky, 2008). The lecturer need to pay attention to several factors that influence the success of the learning process (Wieman, 2007). The success of the teaching and learning process is influenced by: (1) the self of vocational teacher candidates as the main actors in the teaching and learning process, (2) the lecturer himself as the manager of the teaching and learning process with all its uniqueness, (3) the educational objectives which are the targets of achievement of the teaching and learning process, (4) learning materials as the main supporting material for the achievement of objectives, (5) ease of accessing teaching material resources, (6) the atmosphere of learning. From all the descriptions, the lecturer is one of the components that greatly determines the success of vocational teacher candidates in learning and strengthening employability skills . Therefore, lecturers must always try and innovate to find the appropriate strategies, methods, models and approach in learning (Sumayasa, 2015).

Through learning wit scientific approach, professor, lecturer and teaching staff become the learning facilitators so that the learning process can take place more effectively to improve the knowledge, skills and attitudes. Darling-Hammond (2015) corroborates that to realize students' cognition requires the teaching of broad skills from the teaching staff. In addition, Orlich et al. (2012) believes that good teaching staff reflects the way in which they will present their lessons and through their education, having various teaching strategies at their disposal (Irmita & Atun, 2018).

CONCUSIONS

Effective teaching not only involves the use of tools, techniques, and strategies but also the understanding of meaning specifically about how vocational teacher candidates learn, process information, motivate themselves, and pay attention inhibiting factors in learning. Scientific approach is a learning method that regulates learning in stages that contain instructions for conducting learning to vocational teacher candidates. The application of scientific approach can strengthen the employability skills of vocational teacher candidates. This condition is possible because learning is carried out with the scientific stages. This implementation of the scientific approach in learning could strengthen employability skills with the percentages as follows: the medium category by 6.67%, the high category by 73.33%, and 19.17% in the very high category. The amount of contribution in strengthening employability skills was 22.0%. The application of learning strategies with the scientific approach specifically strengthens employability skills in the components as follows: Workplace Skills (K2) and Effective Relationships (K1) components that spread evenly at high levels of reinforcement, while the Applied Knowledge (K3) component is at a moderate level of reinforcement.

SUGGESTION

The results of this study for educational institutions can enrich the reference of educational institutions in constructing curricula and developing lesson plans to implement the scientific approach to learning. This study revealed that university curricula must be redesigned with more direct industry internships and projects, which could facilitate pre-employment training and improve employment capacity of the graduates

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International Journal of Instruction

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Sent: Sunday, April 26, 2020 7:29:53 AM
Subject: Re: minor amendments
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Hadromi Unnes <hadromi@mail.unnes.ac.id> Sun, Apr 26, 2020 at 9:47 PM
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Cc: drsudarman@mail.unnes.ac.id, heri_yudiono@mail.unnes.ac.id, febrian.arif.budiman@mail.unnes.ac.id, khoerulpermana123@gmail.com

Thank you for your reply.

Best regards
Hadromi
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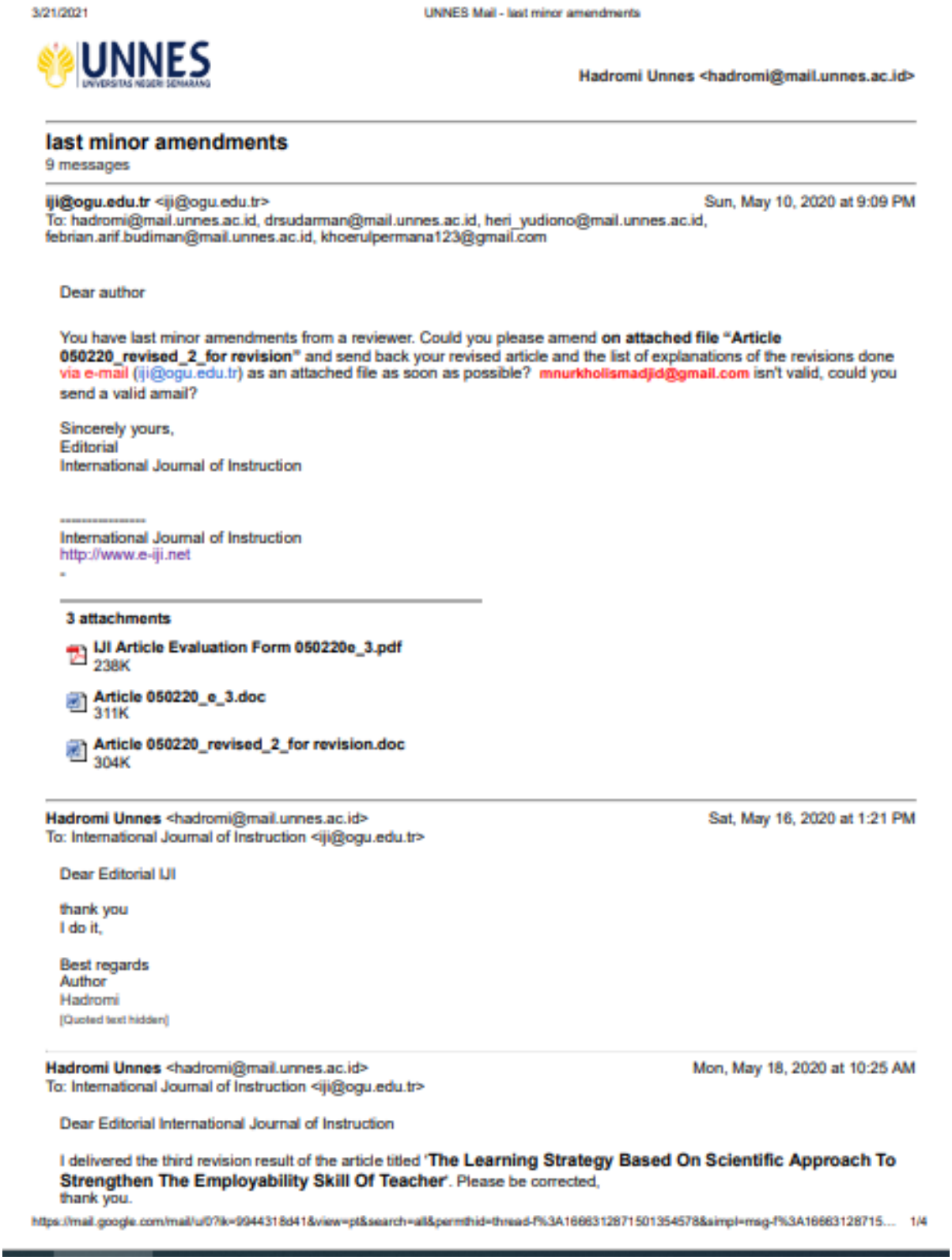

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9 messages

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Lampiran email 10 April 2020

Lampiran 25: Hasil evaluasi ke-3 dari evaluator IJI: IJI

International Journal of Instruction Article Evaluation Form

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It is to acknowledge you that the Executive Committee of *International Journal of Instruction* has decided that the article mentioned below would be reviewed by you. Thank you very much for your contributions.

Asim ARI
Editor in Chief

Name of the article: The Learning Strategy Based on Scientific Approach to Strengthen the Employability Skill of Teacher

After reviewing the attached article, please read each item carefully and select the response that best reflects your opinion. To register your response, please **mark** or **type in** the appropriate block.

	Yes	Partially	No
Do you think the title is appropriate?	☐	☐	☒
Does the abstract summarize the article clearly and effectively?	☐	☒	☐
Are the objectives set clearly?	☐	☐	☒
Is the issue stated clearly?	☐	☐	☒
Is the literature review adequate?	☐	☒	☐
Is the design of the research appropriate, and the exemplary, if any, suitable?	☐	☒	☐
Is the methodology consistent with the practice?	☐	☐	☒
Are the findings expressed clearly?	☐	☒	☐
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Are the tables, if any, arranged well?	☐	☒	☐
Are the conclusions and generalizations based on the findings?	☐	☐	☒
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Are the references adequate?	☐	☒	☐
Is the language clear and understandable?	☐	☒	☐
Is cohesion achieved throughout the article?	☐	☐	☒
Is the work contributing to the field?	☐	☐	☒

Evaluation:

☐ The article can be published as it is.
☐ The article can be published after some revision.
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Would you like to see the revised article if you have suggested any revisions? ☒ Yes ☐ No

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REPORT

Section of the Manuscript	Comments and Notes
Title- Abstract- Summary	The abstract summararize it needs to be clearly and effectively
Introduction and Literature Review	Introduction it needs to be supported by the relevant data from other researches. Literatur review Not just citing the theory but needs to be discussed and reviewed to support the importance of this issue is examined
Research Methods	Researchers should write a heading called "data collection instruments". Then, they can give some explanations about the validity and reliability of these instruments.

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Research Findings	This article is not yet simply state what you found arranged in a logical sequence Preferably preceded by an introductory paragraph before entering the presentation of data to clarify the findings of which will be described
Discussion	it needs to be clarity of the uniqueness and the shortcomings of this study compared with previous studies Present tense to explain significance of results • Past tense to summarize findings, with present tense to interpret results
Conclusion and Suggestions	It must be clear what is the added value of this research to previous reports. It is obligatory to make sure that reported new information is significant for international level readers of IJI
References and Citation	APA 6 should be considered for the references part and use mendeley
Language	Grammar past simple
Other issues	It needs to be clear

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Lampiran 26. Naskah yang perlu diperbaiki: IJI

The Learning Strategy Based On Scientific Approach To Strengthen The Employability Skill Of Teacher

The preparation of Vocational School teacher candidates who have technical skills and employability skills begins with the learning process. This paper aims to formulate learning strategies based on scientific approach to strengthen employability skills for vocational school teacher candidates. This study employed a quantitative approach with a non-experimental survey design. The samples in the study consisted of 120 vocational teacher candidates in the Automotive Engineering Education Program, Faculty of Engineering, Semarang State University (UNNES) who took car body's electrical system practice course. Research data were collected with test questions, observation sheets and questionnaires. The research data were analyzed using descriptive analysis, regression analysis. Data analysis was performed with the help of SPSS software version 20.0 for windows. The results showed that the implementation of learning strategies with scientific approach significantly strengthen employability skills of vocational teacher candidates with a contribution of 22.0%, while the remaining 78% was influenced by other factors. The reinforcement of employability skills vocational teacher candidates resulted in the reinforcement of the competitiveness of prospective graduates. When they have become vocational teachers, they are able to produce competitive vocational school graduates in 4.0 industry era.

Keywords: learning strategies, scientific approach, employability skills, vocational school, teacher candidates

INTRODUCTION

Vocational Education and Technology Institutions (VETIs) are educational institutions with the same level of university which are responsible for educating teacher candidates. Automotive Engineering Education Program at the Faculty of Engineering, Semarang State University is a VETI that produces vocational school teacher candidates in the expertise of Automotive Engineering. Professors, lecturers, and education staffs are expected to conduct a learning process that is responsive to social roles and changes in job skills in the workplace so learners can succeed in the workplace (Hounsell, 2011).

The challenge of VETIs graduates is that the workplace demands graduates with high competition (High Fliers, 2018), VETI is challenged to create outstanding graduates who are best suited for work, innovative, creative (Motallebzadeh et al. 2018). The industrial era 4.0 has induced changes in occupational skills at the workplace (Hamill, 2018). The impact of changes at the workplace in the industrial era 4.0 led to several changes in VETI so that the graduates remain relevant according to market needs and are ready to work. There are 10 top skills required in 2020 (Gray, 2016). Furthermore, Wagner emphasized that in entering the "occupational world" in the 21st century, seven survival skills are required: (1) critical thinking and problem solving; (2) collaboration across networks and leading by influence;(3) agility and adaptability; (4) initiatives and entrepreneurship; (5) effective oral and written communication; (6) accessing and analyzing information; and (7) curiosity and imagination (Wagner,

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2010). Performance of professors, lecturers, and education staffs are influential in producing competencies and the formation of character, mentality and mindset of students (Lapsley & Ryan, 2016). The learning process is expected to develop exceptional human resources, skilled and have high skill (Orlich et al. 2012).

In Indonesia, the Ministry of Research, Technology and Higher Education (Ristekdikti) pays serious attention to VETIs to be able to produce competent teachers with good character and have high employability skills. However, the weak employability skills from VETI graduates who work as teachers both in public schools and in vocational schools, and working in the industry are often highlighted. The graduates of secondary vocational schools, diplomas and higher education are still less competent in terms of: (1) oral and written communication, (2) critical thinking and problem solving, (3) work ethics and professionalism, (4) working in teams and collaborating, (5) working in different groups, (6) using technology, and (7) project management and leadership (Trilling & Fadel, 2009). Those seven components are based on the study of Trilling and Fadel (2009). They are basic skills that every teacher candidates are required to adapt to the workplace.

The employability gap is observed by studies in various parts of the world, including Australia (Evans-Greenwood et al. 2015); India (Smith & Edwards, 2012); Malaysia (Singh & Singh, 2008); Uzbekistan (Ajwad et. al. 2014) and Pakistan (Mirza et al. 2014) found that a major problem in India is the employability skills of labor. In Australia, 22.4% of health entrepreneurs face difficulties in recruiting graduates with the appropriate skills (Messum et al. 2015). A total of 64% engineering entrepreneurs in India stated that they are only 'somewhat satisfied' with the recruitment of new workers (Messum et al. 2015. In Uzbekistan, entrepreneurs reported problems in recruiting employees with the appropriate number of skills reaching only 73% (Ajwad et al. 2014).

Based on these reviews, the efforts to reinforce the employability skills for students as teacher candidates start from the reinforcement of vocational institutions graduates. Especially if it is associated with VETIs as institutions which produce vocational school teachers, the position of employability skills is increasingly strategic to be reinforced in the learning process in VETIs.

This paper aims to formulate a learning strategy with a scientific approach to strengthen employability skills of the vocational teacher candidates. Although, it is recognized that competencies and skills are complex and challenging to learn, the vocational teacher candidates find it difficult to develop employability skills unless they are explicitly taught. Complex competencies and skills must be developed integrated with learning and not with individual learning (Hadromi, 2018)

Employability skills

Employability skills are main skills, soft skills, generic skills, main competencies, transferable skills or personal attributes (Messum et al. 2015). Employability skills as skills which are required not only to get a job, but also for the progress of the company and the workforce can contribute well for the company (Messum et al. 2015).

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Employability skills are general and non-technical competencies required to do all types of work.

According to the results of a study by the American Institutes for Research (2016), employability skills that can be taught through education and workforce development systems, are divided into three broad categories; (1) Effective Relationship, the interpersonal skills and personal qualities that enable individuals to interact effectively with clients, coworkers, and supervisors; (2). Workplace Skills, the analytical and organizational skills and understanding required by employees to successfully perform work tasks; (3). Applied Knowledge, the integration of academic knowledge and wise technical skills, put to practical use in the workplace. (table 1).

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Employability skills have three main parameters, namely: 1) basic skills: communication skills, information management skills, problem solving skills; 2) self-management skills: skills in demonstrating positive attitudes and behavior, responsible skills, adaptive skills, continuous learning skills, safe work skills; and 3) teamwork skills: skills in working with others in the team, skills in participating in a project or task.

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Table 1
Components of employability skills

Skill	Code	Criteria	Including
Effective Relation-ships (K1)	K1-1	Interperson al skills	Understand teamwork and work with others; respond to customers' needs; leadership training; negotiations to resolve conflicts; respecting individual differences.
	K1-2	Personal quality	Demonstrating responsibility and self-discipline; adapt and show flexibility; work independently; demonstrating a desire to learn; demonstrating integrity; demonstrate professionalism; take the initiative; display a positive attitude and sense of self-worth; assume responsibility for professional growth.
Workpla ce Skills (K2)	K2-1	Resource management	Time management: manage money; managing ingredients; arrange personnel.
	K2-2	The use of information	Placing information: organize information; use information; analyze information; communicating information.
	K2-3	Communic ation skills	Communicate verbally: active listening; understand written material; convey information in writing; observe closely.
	K2-4	Systems thinking	Understand and use the system; monitor the System; improve the system
	K2-5	Use of technology	Skills in using various technologies
Applied Knowled ge (K3)	K3-1	Applied academic skills	Using reading skills; use writing skills; use mathematical strategies and procedures; using scientific principles and procedures.
	K3-2	Critical thinking skills	Critical thinking; creative thinking; make good decisions; solve the problem; reason; plan and organize.

(Adopted from: American Institutes for Research. 2016)

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The top 10 skills that are expected to be essential in 2020 include skills like problem-solving, critical thinking, creativity, people management, and coordination. (Gray, 2016). The twenty-first century has reshaped the world in unimaginable ways. Computers and IT have revolutionized the skills needed by a twenty-first century worker (Burrus, Jackson, Xi, & Steinberg, 2013; Levy & Murnane, 2005; Neubert, Mainert, Kretzschmar, & Greiff, 2015). The Assessment & Teaching of twenty-first Century Skills (ATC21S) (Binkley et al., 2012) identified limited but essential skills such as, problem-solving, critical thinking, decision-making, collaboration, and innovation (Javed et al, 2019)

The core of the learning approach based on scientific approach

The scientific approach is a series of processes for answering questions (Prayogi & Yuanita, 2018). Through the thought process, the hypothesis is proposed to be a temporary answer to the question, which has been posed (Putra et al. 2020). The scientific approach as a scientific process consists of six steps: (1) posing the problem, (2) formulating hypotheses, (3) designing an experiment, (4) making observation, (5) collecting data from the experiment, and (6) drawing conclusions ((Prayogi & Yuanita, 2018). scientific approach is a method to generate and answer scientific questions through observation and or experimentation.

Professors, lecturers, and educational staff of vocational subjects must be able to design learning process that can develop cognitive skills, technical skills, and soft skills in the form of employability skills simultaneously. Preparation of vocational school students who have academic skills, technical skills and employability skills stems from the education process of vocational school teacher candidates (Hadromi, 2018), A study conducted by (Prayogi & Yuanita, 2018). (2018) showed that the learning process carried out by vocational teacher education institutions emphasizes on the increasingly strong employability skills of vocational teacher candidates.

The core of learning scientific approach aims to gain scientific knowledge systematically. The scientific approach is rooted in the scientific approach, a concept that emphasizes the process of gaining scientific knowledge. Scientific approach are procedures or processes that prioritize more active and participatory methods (Simonneaux, 2014). This kind of learning strategy can support students to develop hands-on and mind-on and develop students' basic abilities such as communication, interpersonal relationships, critical thinking, and problem solving skills (Lazanyi, 2012). This was confirmed by Prain (2012) who argued that to compete in the 21st century, the young generation must at least have the following abilities; communication skills, interpersonal relationships, critical and rational thinking, problem solving, risk taking, cooperative skills, innovative skills, leadership, and technology.

Scientific approach learning strategies

The application of a scientific approach to learning is basically guided by the characteristics of the scientific approach that is transformed in the steps of learning process. Steps in applying the scientific approach according to Ryan and O'Callaghan (2018) include five steps as follows. STEP 1: Make an OBSERVATION - gather and

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assimilate information about an event, phenomenon, process, or exception to a previous observation, etc. STEP 2: Define the PROBLEM - ask questions about the observation that are relevant and testable. Define the null hypothesis to provide unbiased results. STEP 3: Form the HYPOTHESIS - create an explanation, or educated guess, for the observation that is testable and falsifiable. STEP 4: Conduct the EXPERIMENT - devise and perform an experiment to test the hypothesis. STEP 5: Derive a THEORY - create a statement based on the outcome of the experiment that explains the observation (s) and predicts the likelihood of future observations.

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In line with Ryan and O'Callaghan (2018), the Minister of Education and Culture Regulation Number 22 Year 2016 states that learning steps with a scientific approach include observing, asking, experimenting, reasoning (associating), concluding, and communicating (forming networks). These five steps are known as 5M. The scientific approach is included in the student-centered approach, because in the process, it prioritizes active students in the learning process and the teacher acts as a facilitator.

In the learning process based on a scientific approach, the domain of attitude observes the transformation of learning substance or teaching material so that students "know why." The realm of skill is observing the transformation of learning substance or teaching material so that students "know how". The realm of knowledge observes the transformation of learning substance or teaching material so that students "know what." The result is an increase and balance between the ability to be good human beings (soft skills) and people who have the skills and knowledge to live properly (hard skills) from students who includes aspects of competence, attitudes, skills, and knowledge.

RESEARCH METHODOLOGY

Research design

This study employed a quantitative approach with a non-experimental survey because the study investigated sample data obtained from the population and used a questionnaire as a data collection instrument (Sund & Leslie 1973). The study aims to determine (1) the characteristics of the scientific approach implementation and employability skills variables, (2) confirm whether the indicators of the scientific approach implementation influence the reinforcement of employability skills, and (3) determine the contribution of the scientific approach implementation to reinforcing employability skills. The implementation of the scientific approach as an independent variable, and employability skills as a dependent variable.

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Population and samples.

The research population consisted of 450 students of Automotive Engineering Education Program, Mechanical Engineering Department, Faculty of Engineering, Semarang State University. Furthermore, the sample of this study was determined using a purposive sampling technique. The purposive sampling technique is a type of non-probability sampling that is most effective when one needs to study a certain cultural domain with knowledgeable experts within, Three categories: Studies of specific skills, knowledge, or practices; Comparisons between practices; and Case studies (Tongco, 2007; Karmel & Jain, 1987). Sampling was based on on consideration

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by involving the third semester students and the students who joined program car electrical system course, and AC systems with a total of 120 students.

Research instrument

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The research instrument consisted of (1) scientific approaching learning instruments, (2). The instrument for the employability skills reinforcement of vocational school teacher candidates. The instruments used in learning activities have scientific approaches consisting of syllabus, lesson plans, practice sheets . The instrument was validated by two vocational education experts and two education practitioners (the lecturers of Automotive Engineering Education Program). Validation was performed by giving scores for each component on the validation sheet with a score range of 1 - 4. Score 1 indicates "invalid," 2 indicates "somewhat valid," 3 indicates "valid," and 4 indicates "highly valid." Data analysis from the results of validation was conducted by calculating the average score from experts and practitioners. Validation results showed the following scores: 3, 62 (valid) for syllabus, 3.68 (valid) for lesson plans, 3.70 (valid) for job sheets. Furthermore, the instrument for the scientific approach implementation and employability skills reinforcement consists of 30 questions each. The instruments were validated by using SPSS version 20.0 for windows. The value of Person Correlation for each instrument was between 0.438 to 0.519, and 0.410 to 0, 547 with valid category.

Reliability tests were also conducted on instruments to measure scientific approach implementation, and employability skills reinforcement. Reliability testing involved 54 students who were asked to complete 30 questions that had previously been validated. A score of 54 students was then tested using Cronbach's alpha with the help of Statistical Package for Social Sciences (SPSS) version 20.0 for Windows. Reliability test showed that the Cronbach's alpha value for the scientific approach implementation was 0.747, and 0,791 for the employability skills reinforcement. Both values were greater than 0.6. Therefore, both instruments were considered reliable. Both instruments for scientific approach implementation and employability skills reinforcement were valid and reliable to be used to collect research data

Data analysis

Data in this study were tested for their for homogeneity, normality and linearity before they were analyzed using descriptive analysis, regression analysis. The data analysis of the data was performed with the help of SPSS version 20.0 for Windows. The application of descriptive analysis was conducted to determine the variable characteristics of the scientific approach implementation and employability skills reinforcement. The regression analysis was used to determine the influence and contribution of the scientific approach implementation to employability skills reinforcement.

Prerequisite test

The prerequisite test which was performed before regression analysis consisted of homogeneity test, normality test, and linearity test. The data homogeneity test results with α: 0,5 with numerator df (n-1, where n = 120), and denominator df (n-1, with n

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equal to 120) showed F stat: 1.146, and F table : 1.35 . Because F count < F table, then the data had the same variance (homogeneous).

The results of normality test data using Kolmogorov-Smirnov showed the Sig. Kolmogorov Smirnov = 0.200>α = 0.05, the conclusion is that the data on scientific approach implementation and employability skills are normally distributed. The linearity test results showed the F value was fit (Deviation from linearity is 1.145 with significance 0.311 above 0.05) so that linearity requirements were met.

Stages Of Learning With Scientific Approach

Planning

The planning stage of learning process with employability skills reinforcement for vocational school teacher candidates was conducted in the following steps;

1. The lecturer prepared the learning documents; semester learning plan (RPS); teaching materials, learning media.
2. The lecturer chose a car body's electrical system practice course that was used in conducting research.
3. Vocational teachers and prospective teachers understood the curriculum that strengthens the mutually agreed employability skills of vocational teacher candidates.
4. The vocational school teacher candidate understood the competencies that was applied in learning according to the content of the Automotive Engineering Education Study Program's Curriculum.
5. In this context attitude / affective indicators are taken from the formulation of *employability skills* that already exist in the curriculum consisting of *Effective Relationships* (K1) , *Workplace Skills* (K2) , and *Applied Knowledge* (K3)
6. The selection of the value of employability skills to be developed in vocational school teacher candidates is used as a basis for determining learning and assessment activities.
7. Prepared the assessments; test questions, questionnaires, and observation sheets.

Implementation

The learning process which used the scientific approach was carried out in three stages: (1) preliminary activities; (2) core learning activities; and (3) closing activities. Preliminary activities were carried out by giving orientation to vocational school teacher candidates about the learning material to be delivered, it was continued to provide motivation, apperception, giving references.

The core learning activities were carried out according to the steps of the scientific approach including observing, questioning, experimenting, reasoning (associating), concluding, and communicating (5M) (Utanto et al. 2017) . 5M was applied using ICT-based media and applied the learning technique / method based on students' activities that are fully illustrated in Figure 1.

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Closing activities were carried out by (1) making a summary / conclusion of the lesson by involving the teacher candidate; (2) checking the completion of the tasks; (3) providing feedback and direction / motivation; (4) Delivering follow-up on learning and remedial/enrichment services; (5) Informing the material / tasks of the next meeting; (6) closing the lesson with greetings

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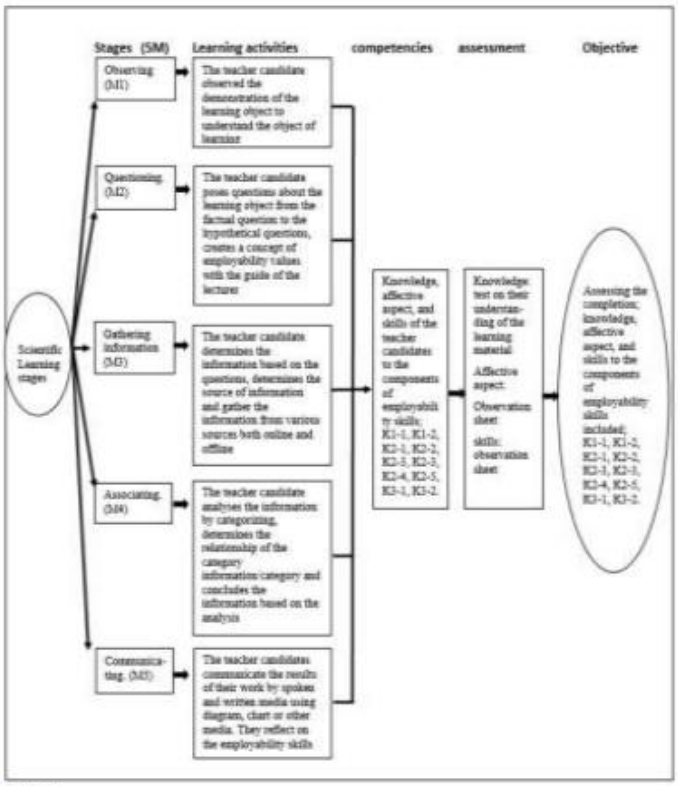

Figure 1
The stages of the implementation of learning process with a scientific approach

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FINDINGS

The Description of Scientific Approach Implementation Data

The data on the implementation of scientific approach were revealed by questionnaire consisting of 30 items in the four scale (1 - 4). A minimum score for the scientific approach implementation variable was equal to 30, the amount of the maximum score was 120, and the mean criterion *(X ¯ k)* was 75. The results of the research data showed

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that the minimum score was 74, the maximum score was 108, the mean score was 92.26, the median score was 92, the mode was 95, and the standard deviation was 6.15. By using the mean score of the criteria ($\bar{X}k = 75$), The mean score of the research data was 92.56 ($\bar{X} = 92.56$). In general, all students in Automotive Engineering Education Department, Faculty of Engineering, Semarang State University perceived the implementation of scientific approach in electrical and air conditioning systems were categorized as very high. Only 6.67 % of students perceived the implementation of the scientific approach in the moderate category, 74.17 % in the high category, 19.16 % in the very high category.

Table 2
Data on strengthening of vocational teacher candidtes' employability skills

Komponen	Effective Relationships (K1)		Workplace Skills (K2)					Applied Knowledge (K3)	
	K1-1	K1-2	K2-1	K2-2	K2-3	K2-4	K2-5	K3-1	K3-2
Sum	412.0	391.0	393.0	402.0	423.0	462.0	386.0	344.0	378.0
Max	5.0	5.0	5.0	5.0	5.0	6.0	5.0	5.0	5.0
Min	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Average	3.4	3.3	3.3	3.4	3.5	3.9	3.2	2.9	3.2
Median	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Mode	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Stdev	0.6	0.7	0.7	0.7	0.8	0.9	0.8	0.7	0.9
Varians	0.4	0.5	0.5	0.5	0.7	0.7	0.6	0.6	0.8

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Note: K1-1: Interpersonal skills, K1-2: Personal quality, K2-1: Resource management, K2-2: The use of information, K2-3: Communication skills, K2-4: Systems thinking, K2-5: Use of technology, K3-1: Applied academic skills, and K3-2: Critical thinking skills.

Description of Employability Skills Reinforcement Data

The variable on employability skills reinforcement of the teacher candidates at vocational school was revealed by the questionnaire. The questionnaire consisted of 30 items in a scale of four (4). The minimum score was 30, the maximum score was 120. Therefore, the mean criteria ($\bar{X}k$) was 75. The results of the research data showed that the minimum score of the employability skills reinforcement was 68, the maximum score was 101, mean score was 90.49 , median score was 92.0, mode was 95, and the standard deviation was 5.71. The percentage of employability skills of students as the vocational teacher candidates in Automotive Engineering Education which were categorized as low was 0.83, the moderate category was 6, 67%, higher category was 73.33%, and 19.17% was on the very high category.

If it is classified, the data for strengthening employability skills for prospective vocational teachers in each component, i.e. (1) *Effective Relationships* (K1), (2) *Workplace Skills* (K2), dan (3) *Applied Knowledge* (K3). (Table 2)

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Hypothesis testing

The SPSS output was a regression model: $Y = 49.438 + 0.445 X + \varepsilon$, at the significance level $\alpha = 5\%$, the null hypothesis was rejected because the sig (0,000) < α (0.05). It can be concluded that the variable X 'learning with a scientific approach' had a significant effect on Y 'the reinforcement of the employability skills of vocational schools teacher candidates'.

F test (model fitness test)

By using SPSS ANOVA, Conclusion on the significance level of 5%, HO was rejected, because the value of sig (0.000) <α (0.05), then the model was fit.

The coefficient of determination (R^2) and correlation coefficient (R)

Correlation coefficient was R = 0, 476 means that there is a relationship between the implementation of scientific approach learning process during electrical in car body and air conditioning systems and employability skills reinforcement on vocational school teacher candidates vocational school teacher candidates in automotive engineering program with valid and reliable indicators of 22.7 % (table 3). The coefficient of Determination value (R Square) was 0,22. Therefore, the contribution of the scientific approach implementation in reinforcing the employability skills was 22.0 %, while the remaining percentage of 78 % is influenced by other factors.

Table 3
The coefficient of determination and correlation

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
	1.476[a]	.227	.220	5,053	.227	34,640	1	118	.000

a. Predictors: (Constant), Scientific approach

b. Dependent Variable: employability skills reinforcement

DISCUSSION

Learning Planning

Lecturers developed a semester learning plan (RPP) with employability skills. The semester learning plan with employability skills was written through the formulation of learning objectives, the selection of learning method, the development of learning scenarios, and the development of learning instruments with employability skills. The formulation of learning objectives was performed by including the employability character indicators and audience, behavior, condition, degree *(ABCD)* components.

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The learning material on car body's electrical system practice was a module which contained the flow diagram on the learning material; electrical lighting systems; central lock; power window; and door lock. The vocational teacher candidates read and understood the flow chart carefully, recognized the characteristics of the car body's electrical system, performed trouble shooting, and repaired the possible damages. In this

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example, vocational teacher candidates read and understood the images carefully was one formulation of communication skills from employability skills as intended by *BCA / ACCI, 2002*. The learning method with employability skills can be selected from a variety of learning methods that have the main characteristics to make students active in learning process. Therefore, in addition to being effective in achieving hard skills competencies, the vocational school candidate can also strengthen their employability skills.

Learning scenarios for *employability skills* were developed from pre-selected learning method such as; the group work method, the project method, and the discussion. Learning scenarios in the form of lecturer teaching activities and learning activities of prospective vocational teacher were organized in the stages of opening activities, core activities, and closing learning activities. The learning assessment was developed in the form of a booklet test to assess cognitive knowledge, observation sheets to observe the behavior (employability skills) of the vocational teacher candidate, and self-evaluation sheet to allow any prospective vocational teachers reported learning activities related to the development of their employability skills.

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Learning Implementation

The scientific approach to learning is similar with the scientific method, or the scientific model commonly used in science learning (Longbotham & Longbotha, 2006; and Keyes, 2010). Implementation of scientific approach was carried out by applying these following steps: Observing, Questioning, Gathering information / experimenting, Associating / processing information, Communicating (5M) as shown in Figure 2.

The implementation of a scientific approach to learning can strengthen the employability skills of vocational teacher candidates in the Automotive Engineering Education study program. The learning process was carried out in these stages; (1) group learning made the vocational teacher candidates felt more confident and comfortable; (2) the stages of observing strengthened them to be more motivated and increase their curiosity; (3) the stage of experimenting / gathering information made vocational teacher candidates more comfortable to gather information that can be performed together, exchanged ideas and experiences; (4) stages of associating, adding breadth and depth to information by processing information by seeking solutions from various sources; (5) communication stage, vocational teacher candidates were trained to convey the results of learning by reporting and presenting to the class. This is in line with the integrated productive practice management model (momantikproter) developed by Hadromi (2015). Hadromi (2015) argued that the application of momantikproter provides opportunities for teaching staff; participants learned to have an integral understanding of practice material, and have implications for increasing motivation to optimize their potential. These steps are steps in strengthening the employability skills of vocational teacher candidates.

The results showed that scientific approach learning had a significant effect on the strengthening of employability skills of prospective vocational teachers (table 2). The contribution of scientific approach to strengthen employability skills was 22.0%. This is possible because the scientific approach to learning involves vocational

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teacher candidates directly to associate learning material in real life contexts (In'am & Hajar, 2017; Stephenson & Sadler-McKnight, 2016). The association of the lessons with real life context in learning makes vocational teacher candidates more creative, innovative, and are able to bring out brilliant ideas in solving problems they face (Bandaranaike, 2018). It appears that as the children had more time to engage with the material, participate in cooperative peer discussions, and receive encouragement from their teachers to provide elaborated feedback to each other (Gillies, 2015), so that it could strengthen the employability skills of vocational teacher candidates (Stephenson & Sadler-McKnight, 2016; Rosenberg et al, 2012).

The sequence of employability skills components from the largest to the smallest is as follows: K2-4, K2-3, K1-1, K2-2, K2-1, K1-2, K2-5, K3-2 and K3-1. This data reveals that strengthening Workplace Skills (K2) and Effective Relationships (K1) are spread evenly at high levels, while the Applied Knowledge (K3) component is spread at lower level. The scientific approach is able to create an atmosphere of active learning, and can make students more creative and innovative in learning the material (Sodik & Wijaya, 2017) supports that the scientific approach in learning process can make the learning atmosphere active and very interesting, because students are confronted with the reality of the material and the facts in their surrounding to increase their motivation to find out more.

Learning Assessment

The implementation of the scientific approach required understanding and creativity of the lecturer in presenting the material with the scientific approach. Scientific approach has advantages and disadvantages (Camuffo et al, 2020). One of the strengths of the scientific approach is that it creates an enjoyable learning situation (Putra et al. 2020; Lyubomirsky, 2008). The lecturer need to pay attention to several factors that influence the success of the learning process (Wieman, 2007). The success of the teaching and learning process is influenced by: (1) the self of vocational teacher candidates as the main actors in the teaching and learning process, (2) the lecturer himself as the manager of the teaching and learning process with all its uniqueness, (3) the educational objectives which are the targets of achievement of the teaching and learning process, (4) learning materials as the main supporting material for the achievement of objectives, (5) ease of accessing teaching material resources, (6) the atmosphere of learning. From all the descriptions, the lecturer is one of the components that greatly determines the success of vocational teacher candidates in learning and strengthening employability skills . Therefore, lecturers must always try and innovate to find the appropriate strategies, methods, models and approach in learning (Sumayasa, 2015).

Through learning wit scientific approach, professor, lecturer and teaching staff become the learning facilitators so that the learning process can take place more effectively to improve the knowledge, skills and attitudes. Darling-Hammond (2015) corroborates that to realize students' cognition requires the teaching of broad skills from the teaching staff. In addition, Orlich et al. (2012) believes that good teaching staff reflects the way in which they will present their lessons and through their education, having various teaching strategies at their disposal (Irmita & Atun, 2018).

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CONCUSIONS

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Effective teaching not only involves the use of tools, techniques, and strategies but also the understanding of meaning specifically about how vocational teacher candidates learn, process information, motivate themselves, and pay attention inhibiting factors in learning. Scientific approach is a learning method that regulates learning in stages that contain instructions for conducting learning to vocational teacher candidates. The application of scientific approach can strengthen the employability skills of vocational teacher candidates. This condition is possible because learning is carried out with the scientific stages. This implementation of the scientific approach in learning could strengthen employability skills with the percentages as follows: the medium category by 6.67%, the high category by 73.33%, and 19.17% in the very high category. The amount of contribution in strengthening employability skills was 22.0%. The application of learning strategies with the scientific approach specifically strengthens employability skills in the components as follows: Workplace Skills (K2) and Effective Relationships (K1) components that spread evenly at high levels of reinforcement, while the Applied Knowledge (K3) component is at a moderate level of reinforcement.

SUGGESTION

The results of this study for educational institutions can enrich the reference of educational institutions in constructing curricula and developing lesson plans to implement the scientific approach to learning. This study revealed that university curricula must be redesigned with more direct industry internships and projects, which could facilitate pre-employment training and improve employment capacity of the graduates

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The Learning Strategy Based On Scientific Approach To Strengthen The Employability Skill Of Teacher

The preparation of Vocational School teacher candidates who have technical skills and employability skills begins with the learning process. This paper aims to formulate learning strategies based on scientific approach to strengthen employability skills for vocational school teacher candidates. This study employed a quantitative approach with a non-experimental survey design. The samples in the study consisted of 120 vocational teacher candidates in the Automotive Engineering Education Program, Faculty of Engineering, Semarang State University who took car body's electrical system practice course. Research data were collected with test questions, observation sheets and questionnaires. The research data were analysed using descriptive analysis, regression analysis. The results showed that the implementation of learning strategies with scientific approach significantly strengthen employability skills of vocational teacher candidates with a contribution of 22.0%, while the remaining 78% was influenced by other factors. The reinforcement of employability skills vocational teacher candidates resulted in the reinforcement of the competitiveness of prospective graduates. When they have become vocational teachers, they are able to produce competitive vocational school graduates in 4.0 industry era.

Keywords: learning strategies, scientific approach, employability skills, vocational school, teacher candidates

INTRODUCTION

Vocational Education and Technology Institutions (VETIs) are educational institutions with the same level of university which are responsible for educating teacher candidates. Automotive Engineering Education Program at the Faculty of Engineering, Semarang State University is a VETI that produces vocational school teacher candidates in the expertise of Automotive Engineering. Professors, lecturers, and education staffs are expected to conduct a learning process that is responsive to social roles and changes in job skills in the workplace so learners can succeed in the workplace (Hounsell, 2011; Helyer, 2011; Nghi & London, 2010).

The challenge of VETIs graduates is that the workplace demands graduates with high competition (Fliers, 2018), VETI is challenged to create outstanding graduates who are best suited for work, innovative, creative (Motallebzadeh et al., 2018). The industrial era 4.0 has induced changes in occupational skills at the workplace (Hamill, 2018). The impact of changes at the workplace in the industrial era 4.0 led to several changes in VETI so that the graduates remain relevant according to market needs and are ready to work. There are 10 top skills required in 2020 (Gray, 2016). Furthermore, Wagner emphasized that in the 21st century, seven survival skills are required: (1) critical thinking and problem solving; (2) collaboration across networks and leading by influence;(3) agility and adaptability; (4) initiatives and entrepreneurship; (5) effective oral and written communication; (6) accessing and analysing information; and (7) curiosity and imagination (Wagner, 2010). Performance of professors, lecturers, and education staffs are influential in producing competencies and the formation of

character, mentality and mindset of students (Lapsley & Ryan, 2016). The learning process is expected to develop exceptional human resources, skilled and have high skill (Orlich et al., 2012).

In Indonesia, the Ministry of Research, Technology and Higher Education (Ristekdikti) pays serious attention to VETIs to be able to produce competent teachers with good character and have high employability skills. Intentionally or not, teachers shape the character of their students, and the best school teachers exemplify a set of virtues which they demonstrate through personal example (Arthur et al., 2015). However, the weak employability skills from VETI graduates who work as teachers both in public schools and in vocational schools, and working in the industry are less competent. The graduates of secondary vocational schools, diplomas and higher education are still less competent in terms of: (1) oral and written communication, (2) critical thinking and problem solving, (3) work ethics and professionalism, (4) working in teams and collaborating, (5) working in different groups, (6) using technology, and (7) project management and leadership (Trilling & Fadel, 2009). Those seven components are based on this study. They are basic skills that every teacher candidates are required to adapt to the workplace.

The employability gap is observed by studies in various parts of the world, including Australia (Evans-Greenwood et al., 2015); India (Smith & Edwards, 2012); Malaysia (Singh & Singh, 2008); Uzbekistan (Ajwad et al., 2014) and Pakistan (Mirza et al., 2014) found that a major problem in India is the employability skills of labor. In Australia, 22.4% of health entrepreneurs face difficulties in recruiting graduates with the appropriate skills (Messum et al., 2015). A total of 64% engineering entrepreneurs in India stated that they are only 'somewhat satisfied' with the recruitment of new workers (Messum et al., 2015). In Uzbekistan, entrepreneurs reported problems in recruiting employees with the appropriate number of skills reaching only 73% (Ajwad et al., 2014).

Based on these reviews, the efforts to reinforce the employability skills for students as teacher candidates start from the reinforcement of vocational institutions graduates. Especially if it is associated with VETIs as institutions which produce vocational school teachers, the position of employability skills is increasingly strategic to be reinforced in the learning process in VETIs. In contrast to previous research, in this study as an effort to strengthen employability skills for teachers candidates through the learning strategy based on scientific approach

This paper aims to formulate a learning strategy with a scientific approach to strengthen employability skills of the vocational teacher candidates. The vocational teacher candidates find it difficult to develop employability skills unless they are explicitly taught. Employability skills must be developed integrated with learning and not with individual learning (Hadromi, 2018)

Employability skills

Employability skills are main skills, soft skills, generic skills, main competencies, transferable skills or personal attributes. Employability skills as skills which are

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required not only to get a job, but also for the progress of the company and the workforce can contribute well for the company (Messum et al., 2015). Employability skills are general and non-technical competencies required to do all types of work.

According to the results of a study by the American Institutes for Research (2016), employability skills that can be taught through education and workforce development systems, are divided into three broad categories; (1) Effective Relationship, the interpersonal skills and personal qualities that enable individuals to interact effectively with clients, co-workers, and supervisors; (2). Workplace Skills, the analytical and organizational skills and understanding required by employees to successfully perform work tasks; (3). Applied Knowledge, the integration of academic knowledge and wise technical skills, put to practical use in the workplace, (table 1).

Employability skills have three main parameters, namely: 1) basic skills: communication skills, information management skills, problem solving skills; 2) self-management skills: skills in demonstrating positive attitudes and behaviours, responsible skills, adaptive skills, continuous learning skills, safe work skills; and 3) teamwork skills: skills in working with others in the team, skills in participating in a project or task. (Sitthisomjin, 2014; Stephens, 2013; Promis, 2008)

Table 1
Components of employability skills

Skill	Code	Criteria	Including
Effective Relation-ships (K1)	K1-1	Interpersonal skills	Understand teamwork and work with others; respond to customers' needs; leadership training; negotiations to resolve conflicts; respecting individual differences.
	K1-2	Personal quality	Demonstrating responsibility and self-discipline; adapt and show flexibility; work independently; demonstrating a desire to learn; demonstrating integrity; demonstrate professionalism; take the initiative; display a positive attitude and sense of self-worth; assume responsibility for professional growth.
Workplace Skills (K2)	K2-1	Resource management	Time management: manage money; managing ingredients; arrange personnel.
	K2-2	The use of information	Placing information: organize information; use information; analyze information; communicating information.
	K2-3	Communication skills	Communicate verbally: active listening; understand written material; convey information in writing; observe closely.
	K2-4	Systems thinking	Understand and use the system; monitor the System; improve the system
	K2-5	Use of technology	Skills in using various technologies
Applied Knowledge (K3)	K3-1	Applied academic skills	Using reading skills; use writing skills; use mathematical strategies and procedures; using scientific principles and procedures.
	K3-2	Critical thinking skills	Critical thinking; creative thinking; make good decisions; solve the problem; reason; plan and organize.

(Adopted from: American Institutes for Research. 2016)

The top 10 skills that are expected to be essential in 2020 include skills like problem-solving, critical thinking, creativity, people management, and coordination. (Gray, 2016). The twenty-first century has reshaped the world in unimaginable ways. Computers and IT have revolutionized the skills needed by a twenty-first century worker (Burrus, Jackson, Xi, & Steinberg, 2013; Levy & Murnane, 2005; Neubert, Mainert, Kretzschmar, & Greiff, 2015). The Assessment & Teaching of twenty-first Century Skills (ATC21S) (Binkley et al., 2012) identified limited but essential skills such as, problem-solving, critical thinking, decision-making, collaboration, and innovation (Javed et al., 2019)

The core of the learning approach based on scientific approach

The scientific approach is a series of processes for answering questions (Prayogi & Yuanita, 2018). Through the thought process, the hypothesis is proposed to be a temporary answer to the question, which has been posed (Putra et al., 2020). The scientific approach as a scientific process consists of six steps: (1) posing the problem, (2) formulating hypotheses, (3) designing an experiment, (4) making observation, (5) collecting data from the experiment, and (6) drawing conclusions ((Prayogi & Yuanita, 2018). scientific approach is a method to generate and answer scientific questions through observation and or experimentation.

Professors, lecturers, and educational staff of vocational subjects must be able to design learning process that can develop cognitive skills, technical skills, and soft skills in the form of employability skills simultaneously. Preparation of vocational school students who have academic skills, technical skills and employability skills stems from the education process of vocational school teacher candidates (Hadromi, 2018), A study conducted by (Prayogi & Yuanita, 2018), showed that the learning process carried out by vocational teacher education institutions emphasizes on the increasingly strong employability skills of vocational teacher candidates.

The core of learning scientific approach aims to gain scientific knowledge systematically. The scientific approach is rooted in the scientific approach, a concept that emphasizes the process of gaining scientific knowledge. Scientific approach are procedures or processes that prioritize more active and participatory methods (Simonneaux, 2014). This kind of learning strategy can support students to develop hands-on and mind-on and develop students' basic abilities such as communication, interpersonal relationships, critical thinking, and problem solving skills (Lazanyi, 2012). This was confirmed by Prain (2012) who argued that to compete in the 21st century, the young generation must at least have the following abilities; communication skills, interpersonal relationships, critical and rational thinking, problem solving, risk taking, cooperative skills, innovative skills, leadership, and technology.

Scientific approach learning strategies

The application of a scientific approach to learning is basically guided by the characteristics of the scientific approach that is transformed in the steps of learning process. Steps in applying the scientific approach according to Ryan and O'Callaghan (2018) include five steps as follows. Step 1: Make an observation - gather and

assimilate information about an event, phenomenon, process, or exception to a previous observation, etc. Step 2: Define the problem - ask questions about the observation that are relevant and testable. Define the null hypothesis to provide unbiased results. Step 3: Form the hypothesis - create an explanation, or educated guess, for the observation that is testable and falsifiable. Step 4: Conduct the experiment - devise and perform an experiment to test the hypothesis. Step 5: Derive a theory - create a statement based on the outcome of the experiment that explains the observation (s) and predicts the likelihood of future observations.

In line with Ryan and O'Callaghan (2018), the Minister of Education and Culture Regulation Number 22 Year 2016 states that learning steps with a scientific approach include observing, asking, experimenting, reasoning (associating), concluding, and communicating (forming networks). These five steps are known as 5M. The scientific approach is included in the student centred approach, because in the process, it prioritizes active students in the learning process and the teacher acts as a facilitator.

In the learning process based on a scientific approach, the domain of attitude observes the transformation of learning substance or teaching material so that students "know why." The realm of skill is observing the transformation of learning substance or teaching material so that students "know how". The realm of knowledge observes the transformation of learning substance or teaching material so that students "know what." The result is an increase and balance between the ability to be good human beings (soft skills) and people who have the skills and knowledge to live properly (hard skills) from students who includes aspects of competence, attitudes, skills, and knowledge.

RESEARCH METHODOLOGY

Research design

This study employed a quantitative approach with a non-experimental survey because the study investigated sample data obtained from the population and used a questionnaire as a data collection instrument (Radhakrishnan, 2013). The study aims to determine (1) the characteristics of the scientific approach implementation and employability skills variables, (2) confirm whether the indicators of the scientific approach implementation influence the reinforcement of employability skills, and (3) determine the contribution of the scientific approach implementation to reinforcing employability skills. The implementation of the scientific approach as an independent variable, and employability skills as a dependent variable.

Population and samples.

The research population consisted of 450 students of Automotive Engineering Education Program, Mechanical Engineering Department, Faculty of Engineering, Semarang State University. Furthermore, the sample of this study was determined using a purposive sampling technique. The purposive sampling technique is a type of non-probability sampling that is most effective when one needs to study a certain cultural domain with knowledgeable experts within, Three categories: Studies of specific skills, knowledge, or practices; Comparisons between practices; and Case studies (Tongco, 2007; Karmel & Jain, 1987). Sampling was based on on consideration

by involving the third semester students and the students who joined program car electrical system course, and AC systems with a total of 120 students.

Research instrument

The research instrument consisted of (1) scientific approaching learning instruments, (2). The instrument for the employability skills reinforcement of vocational school teacher candidates, (table 2).

Table 2.

Indicator of employability skills research instruments

Skill	Criteria	No: Instrument Code: Instrument
Effective Relation-ships	Interpersonal skills	1. : K1.1.1: understand teamwork and work with others 2. : K1.1.2: negotiations to resolve conflicts 3. : K1.1.3: respecting individual differences. 4. : K1.1.4: leadership training
	Personal quality	5. : K1.2.1: demonstrating responsibility and self-discipline 6. : K1.2.2: adapt and show flexibility 7. : K1.2.3: assume responsibility for professional growth. 8. : K1.2.4: work independently
Workplace Skills	Resource management	9. : K2.1.1: time management 10.: K2.1.2: managing ingredients 11.: K2.1.3: arrange personnel
	The use of information	12.: K2.2.1: organize information 13.: K2.2.2: use information 14.: K2.2.3: analyze information 15.: K2.2.4: communicating information
	Communication skills	16.: K2.3.1: communicate verbally 17.: K2.3.2: convey information in writing 18.: K2.3.3: active listening
	Systems thinking	19.: K2.4.1: understand and use the system 20.: K2.4.2: monitor the System 21.: K2.4.3: improve the system
	Use of technology	22.: K2.5.1: skills in using various technologies
Applied Knowledge	Applied academic skills	23.: K3.1.1: using reading skills 24.: K3.1.2: use writing skills 25.: K3.1.3: using scientific principles and procedures
	Critical thinking skills	26.: K3.2.1: critical thinking 27.: K3.2.2: creative thinking 28.: K3.2.3: make good decisions 29.: K3.2.4: solve the problem 30.: K3.2.5: plan and organize.

The instruments used in learning activities have scientific approaches consisting of syllabus, lesson plans, practice sheets . The instrument was validated by two vocational education experts and two education practitioners (the lecturers of Automotive Engineering Education Program). Validation was performed by giving scores for each component on the validation sheet with a score range of 1 - 4. Score 1 indicates

"invalid," 2 indicates "somewhat valid," 3 indicates "valid," and 4 indicates "highly valid." Data analysis from the results of validation was conducted by calculating the average score from experts and practitioners. Validation results showed the following scores: 3, 62 (valid) for syllabus, 3.68 (valid) for lesson plans, 3.70 (valid) for job sheets. Furthermore, the instrument for the scientific approach implementation and employability skills reinforcement consists of 30 questions each. The instruments were validated by using SPSS version 20.0 for windows. The value of Person Correlation for each instrument was between 0.438 to 0.519, and 0.410 to 0, 547 with valid category.

Reliability tests were also conducted on instruments to measure scientific approach implementation, and employability skills reinforcement. Reliability testing involved 54 students who were asked to complete 30 questions that had previously been validated. A score of 54 students was then tested using Cronbach's alpha with the help of Statistical Package for Social Sciences (SPSS) version 20.0 for Windows. Reliability test showed that the Cronbach's alpha value for the scientific approach implementation was 0.747, and 0,791 for the employability skills reinforcement. Both values were greater than 0.6. Therefore, both instruments were considered reliable. Both instruments for scientific approach implementation and employability skills reinforcement were valid and reliable to be used to collect research data

Data analysis

Data in this study were tested for their for homogeneity, normality and linearity before they were analyzed using descriptive analysis, regression analysis. The data analysis of the data was performed with the help of SPSS version 20.0 for Windows. The application of descriptive analysis was conducted to determine the variable characteristics of the scientific approach implementation and employability skills reinforcement. The regression analysis was used to determine the influence and contribution of the scientific approach implementation to employability skills reinforcement.

Prerequisite test

The prerequisite test which was performed before regression analysis consisted of homogeneity test, normality test, and linearity test. The data homogeneity test results with α: 0,5 with numerator df (n-1, where n = 120), and denominator df (n-1, with n equal to 120) showed F stat: 1.146, and F table : 1.35 . Because F count < F table, then the data had the same variance (homogeneous).

The results of normality test data using Kolmogorov-Smirnov showed the Sig. Kolmogorov Smirnov = 0.200>α = 0.05, the conclusion is that the data on scientific approach implementation and employability skills are normally distributed. The linearity test results showed the F value was fit (Deviation from linearity is 1.145 with significance 0.311 above 0.05) so that linearity requirements were met.

Stages Of Learning With Scientific Approach

Planning

The planning stage of learning process with employability skills reinforcement for vocational school teacher candidates was conducted in the following steps;

1. The lecturer prepared the learning documents; semester learning plan; teaching materials, learning media.
2. The lecturer chose a car body's electrical system practice course that was used in conducting research.
3. Vocational teachers and prospective teachers understood the curriculum that strengthens the mutually agreed employability skills of vocational teacher candidates.
4. The vocational school teacher candidate understood the competencies that was applied in learning according to the content of the Automotive Engineering Education Study Program's Curriculum.
5. In this context attitude/affective indicators are taken from the formulation of *employability skills* that already exist in the curriculum consisting of *Effective Relationships* (K1) , *Workplace Skills* (K2) , and *Applied Knowledge* (K3)
6. The selection of the value of employability skills to be developed in vocational school teacher candidates is used as a basis for determining learning and assessment activities.
7. Prepared the assessments; test questions, questionnaires, and observation sheets.

Implementation

The learning process which used the scientific approach was carried out in three stages: (1) preliminary activities; (2) core learning activities; and (3) closing activities. Preliminary activities were carried out by giving orientation to vocational school teacher candidates about the learning material to be delivered, it was continued to provide motivation, apperception, giving references.

The core learning activities were carried out according to the steps of the scientific approach including observing, questioning, experimenting, reasoning (associating), concluding, and communicating (5M) (Utanto et al., 2017) . 5M was applied using ICT-based media and applied the learning technique / method based on students' activities that are fully illustrated in table 3.

Closing activities were carried out by (1) making a summary / conclusion of the lesson by involving the teacher candidate; (2) checking the completion of the tasks; (3) providing feedback and direction / motivation; (4) Delivering follow-up on learning and remedial/enrichment services; (5) Informing the material / tasks of the next meeting; (6) closing the lesson with greetings

Table 3
The stages of the implementation of learning process with a scientific approach

Scientific Learning Stages	Learning Activities	Competencies	Assessment	Objective

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Observing (M1)	The teacher candidate observed the demonstration of the learning object to understand the object of learning	Knowledge, affective aspect, and skills of the teacher candidates to the components of employability skills; K1-1, K1-2, K2-1, K2-2, K2-3, K2-3, K2-4, K2-5, K3-1, K3-2.	Knowledge: test on their understanding of the learning material Affective aspect: Observation sheet skills: observation sheet	Assessing the completion; knowledge, affective aspect, and skills to the components of employability skills included; K1-1, K1-2, K2-1, K2-2, K2-3, K2-3, K2-4, K2-5, K3-1, K3-2.
Questioning. (M2)	The teacher candidate poses questions about the learning object from the factual question to the hypothetical questions, creates a concept of employability values with the guide of the lecturer			
Gathering information (M3)	The teacher candidate determines the information based on the questions, determines the source of information and gather the information from various sources both online and offline			
Associating. (M4)	The teacher candidate analyses the information by categorizing, determines the relationship of the category information/category and concludes the information based on the analysis			
Communicating. (M5)	The teacher candidates communicate the results of their work by spoken and written media using diagram, chart or other media. They reflect on the employability skills			

FINDINGS

The Description of Scientific Approach Implementation Data

The data on the implementation of scientific approach were revealed by questionnaire consisting of 30 items in the four scale (1 - 4). A minimum score for the scientific approach implementation variable was equal to 30, the amount of the maximum score was 120, and the mean criterion *(X ¯ k)* was 75. The results of the research data showed that the minimum score was 74, the maximum score was 108, the mean score was 92.26, the median score was 92, the mode was 95, and the standard deviation was 6.15. By using the mean score of the criteria ($X^{-}k = 75$), The mean score of the research data was 92.56 ($X^{-} = 92.56$). In general, all students in Automotive Engineering Education Department, Faculty of Engineering, Semarang State University

perceived the implementation of scientific approach in electrical and air conditioning systems were categorized as very high. Only 6.67 % of students perceived the implementation of the scientific approach in the moderate category, 74.17 % in the high category, 19.16 % in the very high category.

Table 4
Data on strengthening of vocational teacher candidtes' employability skills

Component	Effective Relationships (K1)		Workplace Skills (K2)					Applied Knowledge (K3)	
	K1-1	K1-2	K2-1	K2-2	K2-3	K2-4	K2-5	K3-1	K3-2
Sum	412.0	391.0	393.0	402.0	423.0	462.0	386.0	344.0	378.0
Max	5.0	5.0	5.0	5.0	5.0	6.0	5.0	5.0	5.0
Min	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Average	3.4	3.3	3.3	3.4	3.5	3.9	3.2	2.9	3.2
Median	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Mode	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Stdev	0.6	0.7	0.7	0.7	0.8	0.9	0.8	0.7	0.9
Varians	0.4	0.5	0.5	0.5	0.7	0.7	0.6	0.6	0.8

Note: K1-1: Interpersonal skills, K1-2: Personal quality, K2-1: Resource management, K2-2: The use of information, K2-3: Communication skills, K2-4: Systems thinking, K2-5: Use of technology, K3-1: Applied academic skills, and K3-2: Critical thinking skills.

Description of Employability Skills Reinforcement Data

The variable on employability skills reinforcement of the teacher candidates at vocational school was revealed by the questionnaire. The questionnaire consisted of 30 items in a scale of four (4). The minimum score was 30, the maximum score was 120. Therefore, the mean criteria ($\bar{X}k$) was 75. The results of the research data showed that the minimum score of the employability skills reinforcement was 68, the maximum score was 101, mean score was 90.49 , median score was 92.0, mode was 95, and the standard deviation was 5.71. The percentage of employability skills of students as the vocational teacher candidates in Automotive Engineering Education which were categorized as low was 0.83, the moderate category was 6, 67%, higher category was 73.33%, and 19.17% was on the very high category.

If it is classified, the data for strengthening employability skills for prospective vocational teachers in each component, i.e. (1) *Effective Relationships* (K1), (2) *Workplace Skills* (K2), dan (3) *Applied Knowledge* (K3). (Table 4)

Hypothesis testing

The SPSS output was a regression model: $Y = 49.438 + 0.445\,X + \varepsilon$, at the significance level $\alpha = 5\%$, the null hypothesis was rejected because the sig (0,000) < α (0.05). It can be concluded that the variable X 'learning with a scientific approach' had a

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significant effect on Y 'the reinforcement of the employability skills of vocational schools teacher candidates'.

F test (model fitness test)

By using SPSS ANOVA, Conclusion on the significance level of 5%, HO was rejected, because the value of sig (0.000) <α (0.05), then the model was fit.

The coefficient of determination (R^2)- and correlation coefficient (R)

Correlation coefficient was R = 0, 476 means that there is a relationship between the implementation of scientific approach learning process during electrical in car body and air conditioning systems and employability skills reinforcement on vocational school teacher candidates vocational school teacher candidates in automotive engineering program with valid and reliable indicators of 22.7 % (table 5). The coefficient of Determination value (R Square) was 0,22. Therefore, the contribution of the scientific approach implementation in reinforcing the employability skills was 22.0 %, while the remaining percentage of 78 % is influenced by other factors.

Table 5
The coefficient of determination and correlation

Model Summary [b]									
					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
	1.476[a]	.227	.220	5,053	.227	34,640	1	118	.000
a. Predictors: (Constant), Scientific approach									
b. Dependent Variable: employability skills reinforcement									

DISCUSSION

Learning Planning

Lecturers developed a semester learning plan with employability skills. The semester learning plan with employability skills was written through the formulation of learning objectives, the selection of learning method, the development of learning scenarios, and the development of learning instruments with employability skills. The formulation of learning objectives was performed by including the employability character indicators and audience, behaviour, condition, degree *(ABCD)* components.

The learning material on car body's electrical system practice was a module which contained the flow diagram on the learning material; electrical lighting systems; central lock; power window; and door lock. The vocational teacher candidates read and understood the flow chart carefully, recognized the characteristics of the car body's electrical system, performed trouble shooting, and repaired the possible damages. In this example, vocational teacher candidates read and understood the images carefully was one formulation of communication skills from employability skills as intended by *BCA / ACCI, 2002*. The learning method with employability skills can be selected from a

variety of learning methods that have the main characteristics to make students active in learning process. Therefore, in addition to being effective in achieving hard skills competencies, the vocational school candidate can also strengthen their employability skills.

Learning scenarios for employability skills were developed from pre-selected learning method such as; the group work method, the project method, and the discussion. Learning scenarios in the form of lecturer teaching activities and learning activities of prospective vocational teacher were organized in the stages of opening activities, core activities, and closing learning activities. The learning assessment was developed in the form of a booklet test to assess cognitive knowledge on the program of Automobile electrical system courses, and air conditioning systems, observation sheets to observe the behaviour (employability skills) of the vocational teacher candidate, and self-evaluation sheet to allow any prospective vocational teachers reported learning activities related to the development of their employability skills.

Learning Implementation

The scientific approach to learning is similar with the scientific method, or the scientific model commonly used in science learning (Longbotham & Longbotha, 2006; and Keyes, 2010). Implementation of scientific approach was carried out by applying these following steps: Observing, Questioning, Gathering information / experimenting, Associating / processing information, Communicating (5M) as shown in table 3.

The implementation of a scientific approach to learning can strengthen the employability skills of vocational teacher candidates in the Automotive Engineering Education study program. The learning process was carried out in these stages; (1) group learning made the vocational teacher candidates felt more confident and comfortable; (2) the stages of observing strengthened them to be more motivated and increase their curiosity; (3) the stage of experimenting / gathering information made vocational teacher candidates more comfortable to gather information that can be performed together, exchanged ideas and experiences; (4) stages of associating, adding breadth and depth to information by processing information by seeking solutions from various sources; (5) communication stage, vocational teacher candidates were trained to convey the results of learning by reporting and presenting to the class. This is in line with the integrated productive practice management model (momantikproter) developed by Hadromi (2015). Hadromi (2015) argued that the application of momantikproter provides opportunities for teaching staff; participants learned to have an integral understanding of practice material, and have implications for increasing motivation to optimize their potential. These steps are steps in strengthening the employability skills of vocational teacher candidates.

The results showed that scientific approach learning had a significant effect on the strengthening of employability skills of prospective vocational teachers (table 5). The contribution of scientific approach to strengthen employability skills was 22.0%. This is possible because the scientific approach to learning involves vocational teacher candidates directly to associate learning material in real life contexts (In'am & Hajar, 2017; Stephenson & Sadler-McKnight, 2016). The association of the lessons

with real life context in learning makes vocational teacher candidates more creative, innovative, and are able to bring out brilliant ideas in solving problems they face (Bandaranaike, 2018). The creativity of teachers candidate grows because learning is centered on students. Professors to act more as facilitators and allow students to take greater responsibility for their own education and increase the levels of interactive education (Khorbortly & Budnik, 2014). It appears that as the children had more time to engage with the material, participate in cooperative peer discussions, and receive encouragement from their teachers to provide elaborated feedback to each other (Gillies, 2015), so that it could strengthen the employability skills of vocational teacher candidates (Stephenson & Sadler-McKnight, 2016; Rosenberg et al, 2012).

The sequence of employability skills components from the largest to the smallest is as follows: K2-4, K2-3, K1-1, K2-2, K2-1, K1-2, K2-5, K3-2 and K3-1. This data reveals that strengthening Workplace Skills (K2) and Effective Relationships (K1) are spread evenly at high levels, while the Applied Knowledge (K3) component is spread at lower level. The scientific approach is able to create an atmosphere of active learning, and can make students more creative and innovative in learning the material (Sodik & Wijaya, 2017) supports that the scientific approach in learning process can make the learning atmosphere active and very interesting, because students are confronted with the reality of the material and the facts in their surrounding to increase their motivation to find out more.

Learning Assessment

The implementation of the scientific approach required understanding and creativity of the lecturer in presenting the material with the scientific approach. Scientific approach has advantages and disadvantages (Camuffo et al., 2020). One of the strengths of the scientific approach is that it creates an enjoyable learning situation (Putra et al., 2020; Lyubomirsky, 2008). The lecturer need to pay attention to several factors that influence the success of the learning process. The success of the teaching and learning process is influenced by; the self of vocational teacher candidates as the main actors in the teaching and learning process (Winarso, 2016); the lecturer himself as the manager of the teaching and learning process with all its uniqueness (Kim et al., 2011; Obwogi, 2013); the educational objectives which are the targets of achievement of the teaching and learning process (Singh & Leavline, 2013); learning materials as the main supporting material for the achievement of objectives (Fox, 2000); ease of accessing teaching material resources (Eucheria, 2020); the atmosphere of learning (Said, 2016). From all the descriptions, the lecturer is one of the components that greatly determines the success of vocational teacher candidates in learning and strengthening employability skills . Therefore, lecturers must always try and innovate to find the appropriate strategies, methods, models and approach in learning.

Through learning wit scientific approach, professor, and lecturer become the learning facilitators so that the learning process can take place more effectively to improve the knowledge, skills and attitudes. Darling-Hammond (2015) corroborates that to realize students' cognition requires the teaching of broad skills from the teaching staff. In addition, Orlich et al. (2012) believes that good teaching staff reflects the way in which

they will present their lessons and through their education, having various teaching strategies at their disposal (Irmita & Atun, 2018).

CONCLUSIONS

Effective teaching not only involves the use of tools, techniques, and strategies but also the understanding of meaning specifically about how vocational teacher candidates learn, process information, motivate themselves, and pay attention inhibiting factors in learning. Scientific approach is a learning method that regulates learning in stages that contain instructions for conducting learning to vocational teacher candidates. The application of scientific approach can strengthen the employability skills of vocational teacher candidates. This condition is possible because learning is carried out with the scientific stages. This implementation of the scientific approach in learning could strengthen employability skills with the percentages as follows: the medium category by 6.67%, the high category by 73.33%, and 19.17% in the very high category. The amount of contribution in strengthening employability skills was 22.0%. The application of learning strategies with the scientific approach specifically strengthens employability skills in the components as follows: Workplace Skills (K2) and Effective Relationships (K1) components that spread evenly at high levels of reinforcement, while the Applied Knowledge (K3) component is at a moderate level of reinforcement.

SUGGESTION

The results of this study for educational institutions can enrich the reference of educational institutions in constructing curricula and developing lesson plans to implement the scientific approach to learning. This study revealed that university curricula must be redesigned with more direct industry internships and projects, which could facilitate pre-employment training and improve employment capacity of the graduates

ACKNOWLEDGEMENTS

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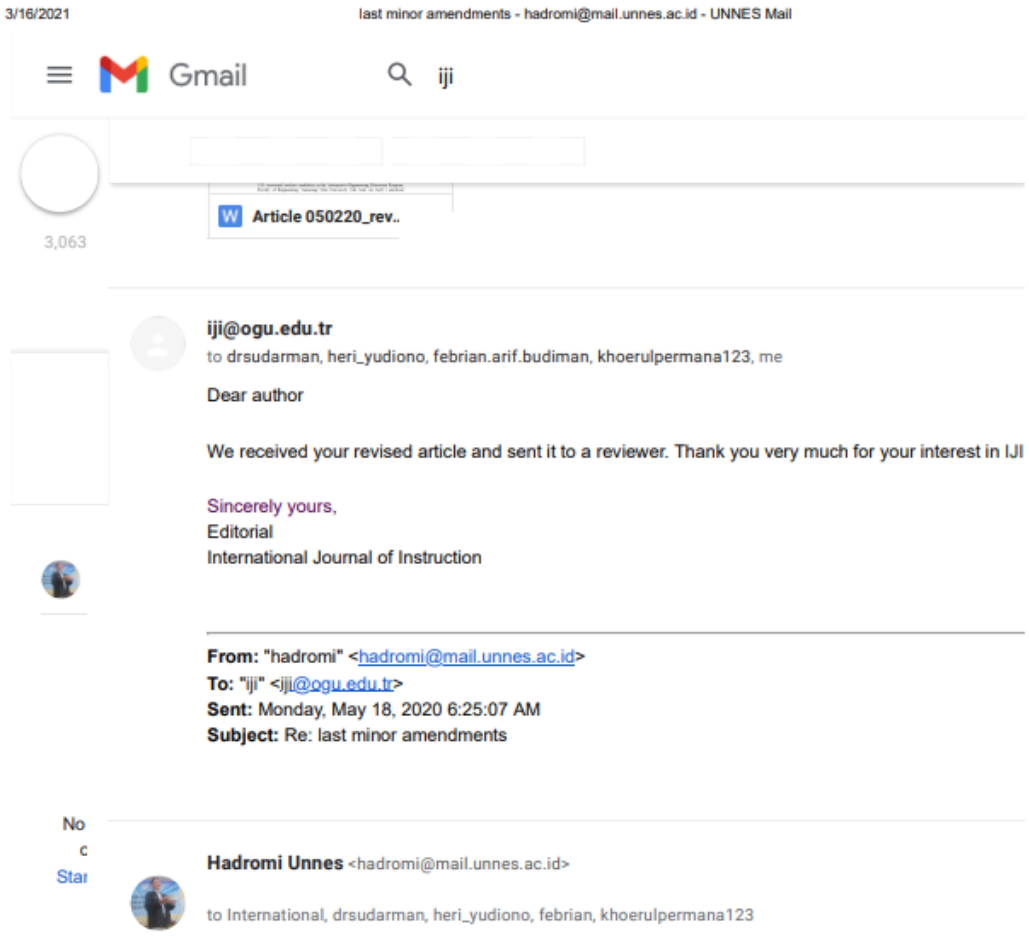
21 Mei 2020: IJI

Lampiran 29. IJI mengirim email ke penulis bahwa editorial IJI telah menerima artikel hasil revisi, dan akan mengkonfirmasi ke evaluator



3/16/2021 last minor amendments - hadromi@mail.unnes.ac.id - UNNES Mail

Gmail iji

3,063

Article 050220_rev..

iji@ogu.edu.tr
to drsudarman, heri_yudiono, febrian.arif.budiman, khoerulpermana123, me

Dear author

We received your revised article and sent it to a reviewer. Thank you very much for your interest in IJI

Sincerely yours,
Editorial
International Journal of Instruction

From: "hadromi" <hadromi@mail.unnes.ac.id>
To: "iji" <iji@ogu.edu.tr>
Sent: Monday, May 18, 2020 6:25:07 AM
Subject: Re: last minor amendments

Hadromi Unnes <hadromi@mail.unnes.ac.id>

to International, drsudarman, heri_yudiono, febrian, khoerulpermana123

.

01 September 2020: IJI
Lampiran 30. Artikel lengkap dan aceepted

UNNES
UNIVERSITAS NEGERI SEMARANG

Hadromi Unnes <hadromi@mail.unnes.ac.id>

Re: last minor amendments: Acceptance

7 messages

International Journal of Instruction <editor.eiji@gmail.com> Tue, Sep 1, 2020 at 6:10 AM
To: Hadromi Unnes <hadromi@mail.unnes.ac.id>, drsudarman@mail.unnes.ac.id, heri_yudiono@mail.unnes.ac.id, febrian.arif.budiman@mail.unnes.ac.id, khoerulpermana123@gmail.com, mm1057233@gmail.com

Dear author

" Article 050220 "

This article has been completed the reviewing process and has been accepted for publication. Your manuscript is tentatively scheduled for publication in the April 2021 issue.

We wish you all the best.

Editorial

International Journal of Instruction

International Journal of Instruction
http://www.e-iji.net
http://www.gateacademy.ch

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01 September 2020: Penulis
Lampiran 31. Permohnan ke IJI supaya artikel bisa diterbitkan bulan Oktober 2020

Dear
Editorial
International Journal of Instruction

I really hope my article is titled: ' **The Learning Strategy Based On Scientific Approach To Strengthen The Employability Skill Of Teacher** ' can be accepted for publication in International Journal of Instruction

Help me

Best Regards,

Hadromi Unnes <hadromi@mail.unnes.ac.id> Tue, Sep 1, 2020 at 8:24 AM
To: International Journal of Instruction <editor.eiji@gmail.com>

Dear Editorial
International Journal of Instruction

Thank you for your acceptance of my article " **The Learning Strategy Based On Scientific Approach To Strengthen The Employability Skill Of Teacher** ",
May I ask that it be published in the October 2020 edition, because it is for the purposes of a professor's administration proposal
Please help us,

Thank you,

https://mail.google.com/mail/u/0?ik=9944318d41&view=pt&search=all&permthid=thread-f%3A1676584371812132273&simpl=msg-f%3A16765843718… 1/4

3/21/2021 UNNES Mail - Re: last minor amendments: Acceptance

Best regards,

Hadromi, Asst. Prof., corresponding author, Semarang State University, Sekaran- Gunungpati kota Semarang, Central Java Province Indonesia Indonesia, *hadromi@mail.unnes.ac.id*

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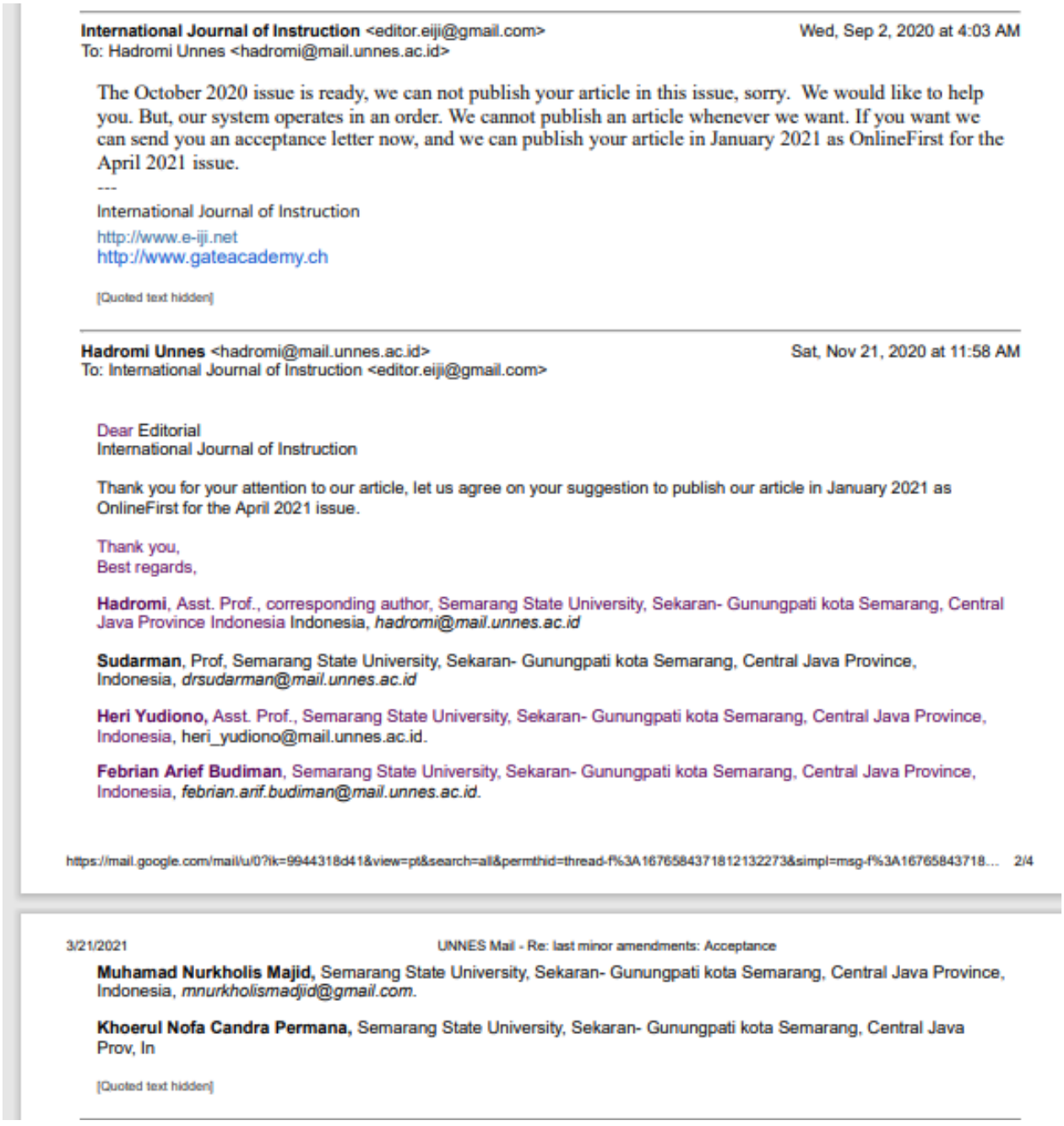
Khoerul Nofa Candra Permana, Semarang State University, Sekaran- Gunungpati kota Semarang, Central Java Prov, Indonesia, khoerulpermana123@gmail.com

.

2 September 2020: IJI

Lampiran 32. IJI menjawab permohonan email tgl 01 September 2020, Bahwa keputusan IJI tidak bisa diubah, karena keputusan yang diambil adalah sudah sesuai dengan mekanisme jurnal



International Journal of Instruction <editor.eiji@gmail.com> Wed, Sep 2, 2020 at 4:03 AM
To: Hadromi Unnes <hadromi@mail.unnes.ac.id>

The October 2020 issue is ready, we can not publish your article in this issue, sorry. We would like to help you. But, our system operates in an order. We cannot publish an article whenever we want. If you want we can send you an acceptance letter now, and we can publish your article in January 2021 as OnlineFirst for the April 2021 issue.

International Journal of Instruction

http://www.e-iji.net
http://www.gateacademy.ch

[Quoted text hidden]

Hadromi Unnes <hadromi@mail.unnes.ac.id> Sat, Nov 21, 2020 at 11:58 AM
To: International Journal of Instruction <editor.eiji@gmail.com>

Dear Editorial
International Journal of Instruction

Thank you for your attention to our article, let us agree on your suggestion to publish our article in January 2021 as OnlineFirst for the April 2021 issue.

Thank you,
Best regards,

Hadromi, Asst. Prof., corresponding author, Semarang State University, Sekaran- Gunungpati kota Semarang, Central Java Province Indonesia Indonesia, *hadromi@mail.unnes.ac.id*

Sudarman, Prof, Semarang State University, Sekaran- Gunungpati kota Semarang, Central Java Province, Indonesia, *drsudarman@mail.unnes.ac.id*

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Febrian Arief Budiman, Semarang State University, Sekaran- Gunungpati kota Semarang, Central Java Province, Indonesia, *febrian.arif.budiman@mail.unnes.ac.id*.

https://mail.google.com/mail/u/0?ik=9944318d41&view=pt&search=all&permthid=thread-f%3A1676584371812132273&simpl=msg-f%3A16765843718... 2/4

3/21/2021 UNNES Mail - Re: last minor amendments: Acceptance

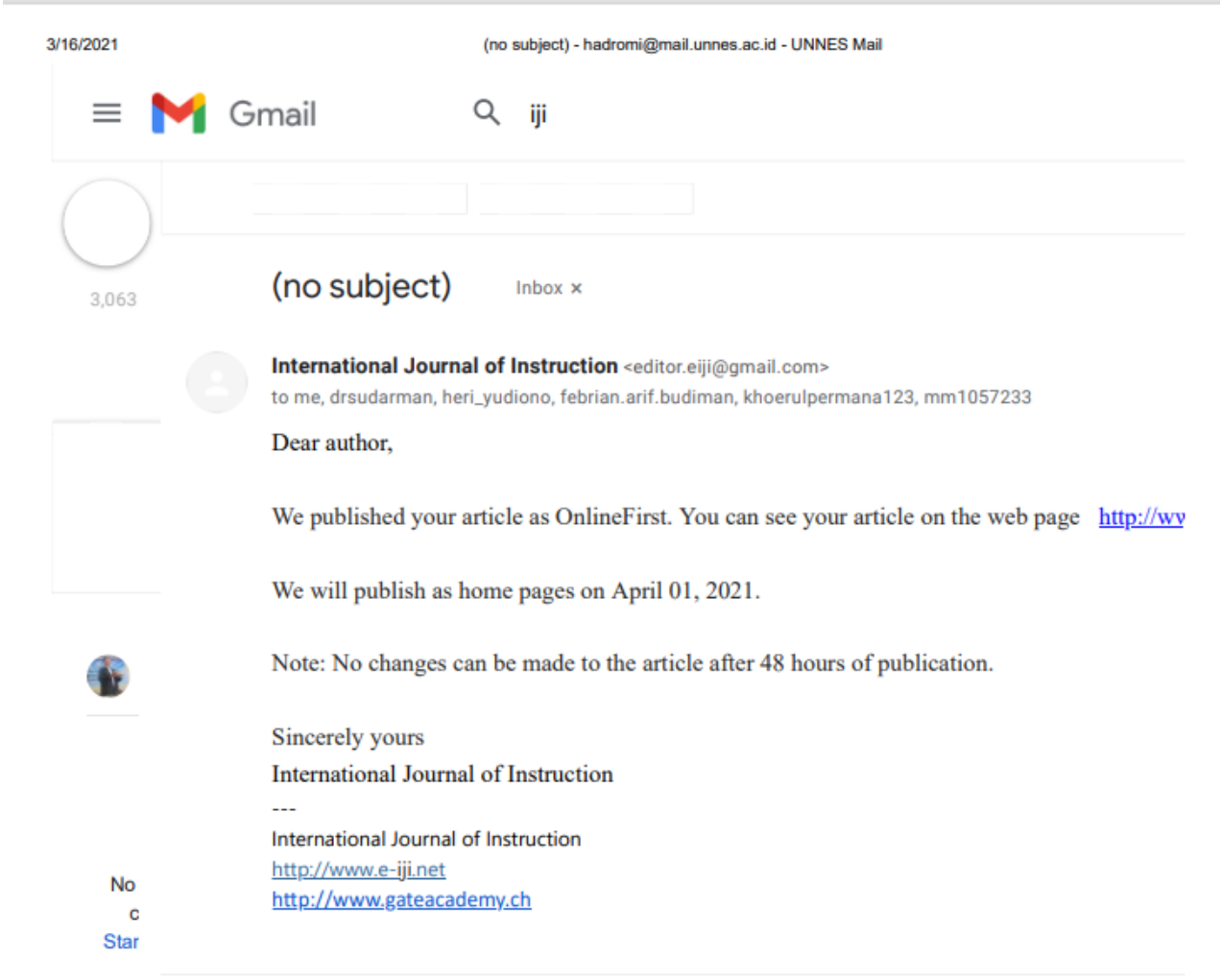
Muhamad Nurkholis Majid, Semarang State University, Sekaran- Gunungpati kota Semarang, Central Java Province, Indonesia, *mnurkholismadjid@gmail.com*.

Khoerul Nofa Candra Permana, Semarang State University, Sekaran- Gunungpati kota Semarang, Central Java Prov, In

[Quoted text hidden]

.

7 Februari 2021: IJI
Lampiran 33. Penyampaian artikel yang akan diterbitkan dari iji ke penulis



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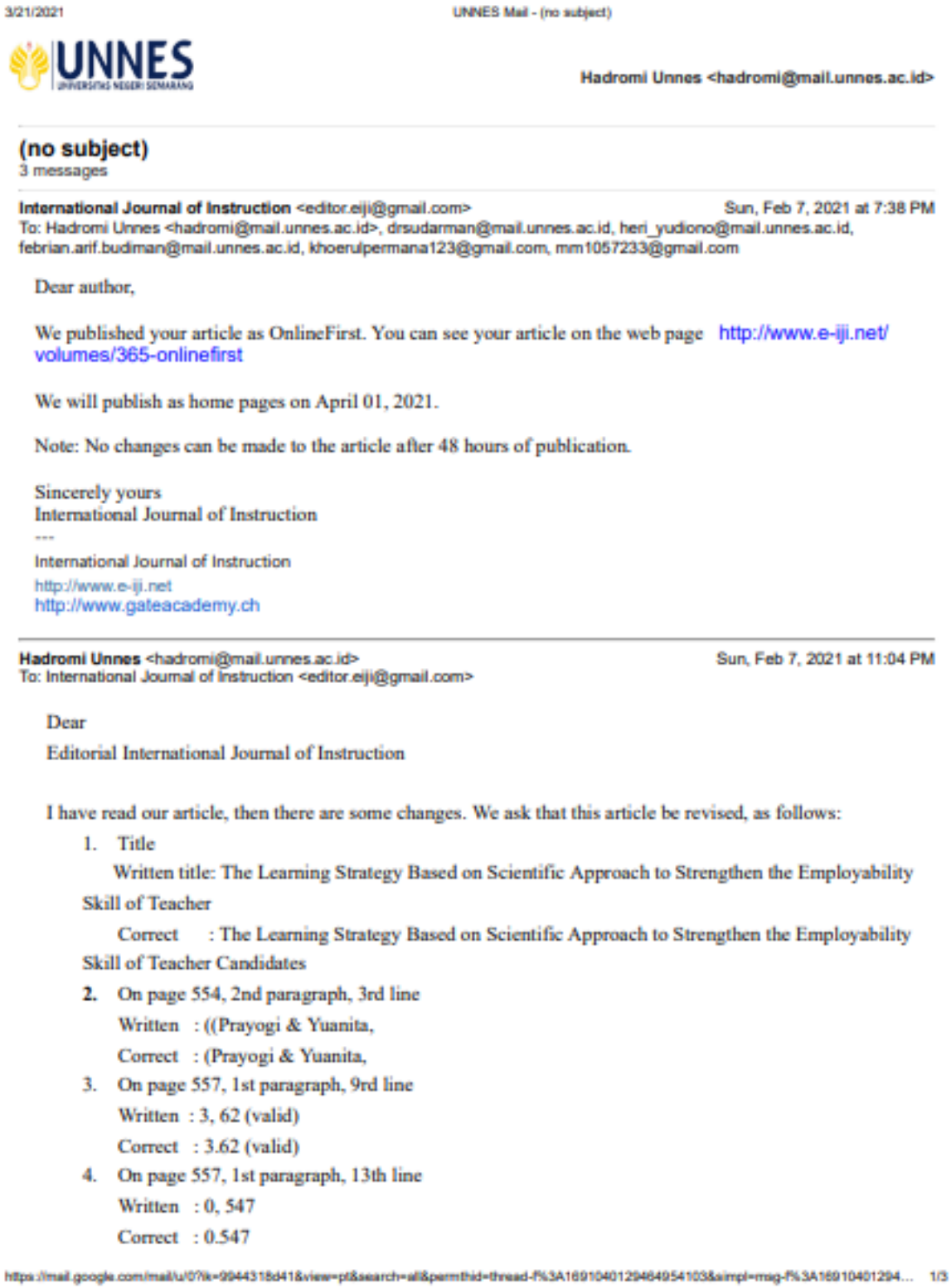
7 Februari 2020: Penulis

Lampiran 34. Permohonan kepada iji untuk perbaikan kesalahan penulisan, dan kata



3/21/2021 UNNES Mail - (no subject)

UNNES
UNIVERSITAS NEGERI SEMARANG

Hadromi Unnes <hadromi@mail.unnes.ac.id>

(no subject)
3 messages

International Journal of Instruction <editor.eiji@gmail.com> Sun, Feb 7, 2021 at 7:38 PM
To: Hadromi Unnes <hadromi@mail.unnes.ac.id>, drsudarman@mail.unnes.ac.id, heri_yudiono@mail.unnes.ac.id, febrian.arif.budiman@mail.unnes.ac.id, khoerulpermana123@gmail.com, mm1057233@gmail.com

Dear author,

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Hadromi Unnes <hadromi@mail.unnes.ac.id> Sun, Feb 7, 2021 at 11:04 PM
To: International Journal of Instruction <editor.eiji@gmail.com>

Dear
Editorial International Journal of Instruction

I have read our article, then there are some changes. We ask that this article be revised, as follows:

1. Title
   Written title: The Learning Strategy Based on Scientific Approach to Strengthen the Employability Skill of Teacher
   Correct : The Learning Strategy Based on Scientific Approach to Strengthen the Employability Skill of Teacher Candidates
2. On page 554, 2nd paragraph, 3rd line
   Written : ((Prayogi & Yuanita,
   Correct : (Prayogi & Yuanita,
3. On page 557, 1st paragraph, 9rd line
   Written : 3, 62 (valid)
   Correct : 3.62 (valid)
4. On page 557, 1st paragraph, 13th line
   Written : 0, 547
   Correct : 0.547

https://mail.google.com/mail/u/0?ik=9944318d41&view=pt&search=all&permthid=thread-f%3A1691040129464954103&simpl=msg-f%3A16910401294... 1/3

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5. On page 558, 1st paragraph, 7th line
   Written : 0,791
   Correct : 0.791
6. On page 558, 3rd paragraph, 10rd line
   Written : α: 0,5
   Correct : α: 0.5
7. On page 561, 2nd paragraph, 10th line
   Written : 6, 67%
   Correct : 6.67%
8. On page 561, 3rd paragraph, 3rd line
   Written : dan (3) Applied Knowledge (K3). (Table 4)
   Correct : and (3) Applied Knowledge (K3), (table 4).
9. On page 562, 1st paragraph, 1st line
   Written : R = 0, 476
   Correct : R = 0.476
10. On page 562, 1st paragraph, 6th line
    Written : was 0,22.
    Corect : was 0.22

Thus, for your revision, we would like to thank you very much,
Thank you

Best regards,
Author,

Hadromi, et al.
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3 attachments

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8 Februari 2020: IJI

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Tanggal 8 Februari 2021:

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The Learning Strategy Based on Scientific Approach to Strengthen the Employability Skill of Teacher Candidates

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The preparation of Vocational School teacher candidates who have technical skills and employability skills begins with the learning process. This paper aims to formulate learning strategies based on scientific approach to strengthen employability skills for vocational school teacher candidates. This study employed a quantitative approach with a non-experimental survey design. The samples in the study consisted of 120 vocational teacher candidates in the Automotive Engineering Education Program, Faculty of Engineering, Semarang State University who took car body's electrical system practice course. Research data were collected with test questions, observation sheets and questionnaires. The research data were analysed using descriptive analysis, regression analysis. The results showed that the implementation of learning strategies with scientific approach significantly strengthen employability skills of vocational teacher candidates with a contribution of 22.0%, while the remaining 78% was influenced by other factors. The reinforcement of employability skills vocational teacher candidates resulted in the reinforcement of the competitiveness of prospective graduates. When they have become vocational teachers, they are able to produce competitive vocational school graduates in 4.0 industry era.

Keywords: learning strategies, scientific approach, employability skills, vocational school, teacher candidates

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INTRODUCTION

Vocational Education and Technology Institutions (VETIs) are educational institutions with the same level of university which are responsible for educating teacher candidates. Automotive Engineering Education Program at the Faculty of Engineering, Semarang State University is a VETI that produces vocational school teacher candidates in the expertise of Automotive Engineering. Professors, lecturers, and education staffs are expected to conduct a learning process that is responsive to social roles and changes in job skills in the workplace so learners can succeed in the workplace (Hounsell, 2011; Helyer, 2011; Nghi & London, 2010).

The challenge of VETIs graduates is that the workplace demands graduates with high competition (Fliers, 2018), VETI is challenged to create outstanding graduates who are best suited for work, innovative, creative (Motallebzadeh et al., 2018). The industrial era 4.0 has induced changes in occupational skills at the workplace (Hamill, 2018). The impact of changes at the workplace in the industrial era 4.0 led to several changes in VETI so that the graduates remain relevant according to market needs and are ready to work. There are 10 top skills required in 2020 (Gray, 2016). Furthermore, Wagner emphasized that in the 21st century, seven survival skills are required: (1) critical thinking and problem solving; (2) collaboration across networks and leading by influence;(3) agility and adaptability; (4) initiatives and entrepreneurship; (5) effective oral and written communication; (6) accessing and analysing information; and (7) curiosity and imagination (Wagner, 2010). Performance of professors, lecturers, and education staffs are influential in producing competencies and the formation of character, mentality and mindset of students (Lapsley & Ryan, 2016). The learning process is expected to develop exceptional human resources, skilled and have high skill (Orlich et al., 2012).

In Indonesia, the Ministry of Research, Technology and Higher Education (Ristekdikti) pays serious attention to VETIs to be able to produce competent teachers with good character and have high employability skills. Intentionally or not, teachers shape the character of their students, and the best school teachers exemplify a set of virtues which they demonstrate through personal example (Arthur et al., 2015). However, the weak employability skills from VETI graduates who work as teachers both in public schools and in vocational schools and working in the industry are less competent. The graduates of secondary vocational schools, diplomas and higher education are still less competent in terms of: (1) oral and written communication, (2) critical thinking and problem solving, (3) work ethics and professionalism, (4) working in teams and collaborating, (5) working in different groups, (6) using technology, and (7) project management and leadership (Trilling & Fadel, 2009). Those seven components are based on this study. They are basic skills that every teacher candidates are required to adapt to the workplace.

The employability gap is observed by studies in various parts of the world, including Australia (Evans-Greenwood et al., 2015); India (Smith & Edwards, 2012); Malaysia (Singh & Singh, 2008); Uzbekistan (Ajwad et al., 2014) and Pakistan (Mirza et al., 2014) found that a major problem in India is the employability skills of labor. In

Australia, 22.4% of health entrepreneurs face difficulties in recruiting graduates with the appropriate skills (Messum et al., 2015). A total of 64% engineering entrepreneurs in India stated that they are only 'somewhat satisfied' with the recruitment of new workers (Messum et al., 2015). In Uzbekistan, entrepreneurs reported problems in recruiting employees with the appropriate number of skills reaching only 73% (Ajwad et al., 2014).

Based on these reviews, the efforts to reinforce the employability skills for students as teacher candidates start from the reinforcement of vocational institutions graduates. Especially if it is associated with VETIs as institutions which produce vocational school teachers, the position of employability skills is increasingly strategic to be reinforced in the learning process in VETIs. In contrast to previous research, in this study as an effort to strengthen employability skills for teachers candidates through the learning strategy based on scientific approach

This paper aims to formulate a learning strategy with a scientific approach to strengthen employability skills of the vocational teacher candidates. The vocational teacher candidates find it difficult to develop employability skills unless they are explicitly taught. Employability skills must be developed integrated with learning and not with individual learning (Hadromi, 2018)

Employability skills

Employability skills are main skills, soft skills, generic skills, main competencies, transferable skills or personal attributes. Employability skills as skills which are required not only to get a job, but also for the progress of the company and the workforce can contribute well for the company (Messum et al., 2015). Employability skills are general and non-technical competencies required to do all types of work.

According to the results of a study by the American Institutes for Research (2016), employability skills that can be taught through education and workforce development systems, are divided into three broad categories; (1) Effective Relationship, the interpersonal skills and personal qualities that enable individuals to interact effectively with clients, co-workers, and supervisors; (2). Workplace Skills, the analytical and organizational skills and understanding required by employees to successfully perform work tasks; (3). Applied Knowledge, the integration of academic knowledge and wise technical skills, put to practical use in the workplace, (table 1).

Employability skills have three main parameters, namely: 1) basic skills: communication skills, information management skills, problem solving skills; 2) self-management skills: skills in demonstrating positive attitudes and behaviours, responsible skills, adaptive skills, continuous learning skills, safe work skills; and 3) teamwork skills: skills in working with others in the team, skills in participating in a project or task. (Sitthisomjin, 2014; Stephens, 2013; Promis, 2008)

Table 1
Components of employability skills

Skill	Code	Criteria	Including
Effective Relation-ships (K1)	K1-1	Interpersonal skills	Understand teamwork and work with others; respond to customers' needs; leadership training; negotiations to resolve conflicts; respecting individual differences.
	K1-2	Personal quality	Demonstrating responsibility and self-discipline; adapt and show flexibility; work independently; demonstrating a desire to learn; demonstrating integrity; demonstrate professionalism; take the initiative; display a positive attitude and sense of self-worth; assume responsibility for professional growth.
Workplace Skills (K2)	K2-1	Resource management	Time management: manage money; managing ingredients; arrange personnel.
	K2-2	The use of information	Placing information: organize information; use information; analyze information; communicating information.
	K2-3	Communicatio n skills	Communicate verbally: active listening; understand written material; convey information in writing; observe closely.
	K2-4	Systems thinking	Understand and use the system; monitor the System; improve the system
	K2-5	Use of technology	Skills in using various technologies
Applied Knowledge (K3)	K3-1	Applied academic skills	Using reading skills; use writing skills; use mathematical strategies and procedures; using scientific principles and procedures.
	K3-2	Critical thinking skills	Critical thinking; creative thinking; make good decisions; solve the problem; reason; plan and organize.

(Adopted from: American Institutes for Research. 2016)

The top 10 skills that are expected to be essential in 2020 include skills like problem-solving, critical thinking, creativity, people management, and coordination. (Gray, 2016). The twenty-first century has reshaped the world in unimaginable ways. Computers and IT have revolutionized the skills needed by a twenty-first century worker (Burrus, Jackson, Xi, & Steinberg, 2013; Levy & Murnane, 2005; Neubert, Mainert, Kretzschmar, & Greiff, 2015). The Assessment & Teaching of twenty-first Century Skills (ATC21S) (Binkley et al., 2012) identified limited but essential skills such as, problem-solving, critical thinking, decision-making, collaboration, and innovation (Javed et al., 2019)

The core of the learning approach based on scientific approach

The scientific approach is a series of processes for answering questions (Prayogi & Yuanita, 2018). Through the thought process, the hypothesis is proposed to be a temporary answer to the question, which has been posed (Putra et al., 2020). The scientific approach as a scientific process consists of six steps: (1) posing the problem, (2) formulating hypotheses, (3) designing an experiment, (4) making observation, (5) collecting data from the experiment, and (6) drawing conclusions (Prayogi & Yuanita, 2018). scientific approach is a method to generate and answer scientific questions through observation and or experimentation.

Professors, lecturers, and educational staff of vocational subjects must be able to design learning process that can develop cognitive skills, technical skills, and soft skills in the form of employability skills simultaneously. Preparation of vocational school students who have academic skills, technical skills and employability skills stems from the education process of vocational school teacher candidates (Hadromi, 2018), A study conducted by (Prayogi & Yuanita, 2018), showed that the learning process carried out by vocational teacher education institutions emphasizes on the increasingly strong employability skills of vocational teacher candidates.

The core of learning scientific approach aims to gain scientific knowledge systematically. The scientific approach is rooted in the scientific approach, a concept that emphasizes the process of gaining scientific knowledge. Scientific approach are procedures or processes that prioritize more active and participatory methods (Simonneaux, 2014). This kind of learning strategy can support students to develop hands-on and mind-on and develop students' basic abilities such as communication, interpersonal relationships, critical thinking, and problem solving skills (Lazanyi, 2012). This was confirmed by Prain (2012) who argued that to compete in the 21st century, the young generation must at least have the following abilities; communication skills, interpersonal relationships, critical and rational thinking, problem solving, risk taking, cooperative skills, innovative skills, leadership, and technology.

Scientific approach learning strategies

The application of a scientific approach to learning is basically guided by the characteristics of the scientific approach that is transformed in the steps of learning process. Steps in applying the scientific approach according to Ryan and O'Callaghan (2018) include five steps as follows. Step 1: Make an observation - gather and assimilate information about an event, phenomenon, process, or exception to a previous observation, etc. Step 2: Define the problem - ask questions about the observation that are relevant and testable. Define the null hypothesis to provide unbiased results. Step 3: Form the hypothesis - create an explanation, or educated guess, for the observation that is testable and falsifiable. Step 4: Conduct the experiment - devise and perform an experiment to test the hypothesis. Step 5: Derive a theory - create a statement based on the outcome of the experiment that explains the observation (s) and predicts the likelihood of future observations.

In line with Ryan and O'Callaghan (2018), the Minister of Education and Culture Regulation Number 22 Year 2016 states that learning steps with a scientific approach include observing, asking, experimenting, reasoning (associating), concluding, and communicating (forming networks). These five steps are known as 5M. The scientific approach is included in the student centred approach, because in the process, it prioritizes active students in the learning process and the teacher acts as a facilitator.

In the learning process based on a scientific approach, the domain of attitude observes the transformation of learning substance or teaching material so that students "know why." The realm of skill is observing the transformation of learning substance or teaching material so that students "know how". The realm of knowledge observes the

transformation of learning substance or teaching material so that students "know what." The result is an increase and balance between the ability to be good human beings (soft skills) and people who have the skills and knowledge to live properly (hard skills) from students who includes aspects of competence, attitudes, skills, and knowledge.

METHOD

Research design

This study employed a quantitative approach with a non-experimental survey because the study investigated sample data obtained from the population and used a questionnaire as a data collection instrument (Radhakrishnan, 2013). The study aims to determine (1) the characteristics of the scientific approach implementation and employability skills variables, (2) confirm whether the indicators of the scientific approach implementation influence the reinforcement of employability skills, and (3) determine the contribution of the scientific approach implementation to reinforcing employability skills. The implementation of the scientific approach as an independent variable, and employability skills as a dependent variable.

Population and samples.

The research population consisted of 450 students of Automotive Engineering Education Program, Mechanical Engineering Department, Faculty of Engineering, Semarang State University. Furthermore, the sample of this study was determined using a purposive sampling technique. The purposive sampling technique is a type of non-probability sampling that is most effective when one needs to study a certain cultural domain with knowledgeable experts within, Three categories: Studies of specific skills, knowledge, or practices; Comparisons between practices; and Case studies (Tongco, 2007; Karmel & Jain, 1987). Sampling was based on on consideration by involving the third semester students and the students who joined program car electrical system course, and AC systems with a total of 120 students.

Research instrument

The research instrument consisted of (1) scientific approaching learning instruments, (2). The instrument for the employability skills reinforcement of vocational school teacher candidates, (table 2).

Table 2
Indicator of employability skills research instruments

Skill	Criteria	No: Instrument Code: Instrument
Effective Relation-ships	Interpersonal skills	1. : K1.1.1: understand teamwork and work with others 2. : K1.1.2: negotiations to resolve conflicts 3. : K1.1.3: respecting individual differences. 4. : K1.1.4: leadership training
	Personal quality	5. : K1.2.1: demonstrating responsibility and self-discipline 6. : K1.2.2: adapt and show flexibility 7. : K1.2.3: assume responsibility for professional growth. 8. : K1.2.4: work independently
Workplace Skills	Resource management	9. : K2.1.1: time management 10.: K2.1.2: managing ingredients 11.: K2.1.3: arrange personnel
	The use of information	12.: K2.2.1: organize information 13.: K2.2.2: use information 14.: K2.2.3: analyze information 15.: K2.2.4: communicating information
	Communication skills	16.: K2.3.1: communicate verbally 17.: K2.3.2: convey information in writing 18.: K2.3.3: active listening
	Systems thinking	19.: K2.4.1: understand and use the system 20.: K2.4.2: monitor the System 21.: K2.4.3: improve the system
	Use of technology	22.: K2.5.1: skills in using various technologies
Applied Knowledge	Applied academic skills	23.: K3.1.1: using reading skills 24.: K3.1.2: use writing skills 25.: K3.1.3: using scientific principles and procedures
	Critical thinking skills	26.: K3.2.1: critical thinking 27.: K3.2.2: creative thinking 28.: K3.2.3: make good decisions 29.: K3.2.4: solve the problem 30.: K3.2.5: plan and organize.

The instruments used in learning activities have scientific approaches consisting of syllabus, lesson plans, practice sheets . The instrument was validated by two vocational education experts and two education practitioners (the lecturers of Automotive Engineering Education Program). Validation was performed by giving scores for each component on the validation sheet with a score range of 1 - 4. Score 1 indicates "invalid," 2 indicates "somewhat valid," 3 indicates "valid," and 4 indicates "highly valid." Data analysis from the results of validation was conducted by calculating the average score from experts and practitioners. Validation results showed the following scores: 3.62 (valid) for syllabus, 3.68 (valid) for lesson plans, 3.70 (valid) for job sheets. Furthermore, the instrument for the scientific approach implementation and employability skills reinforcement consists of 30 questions each. The instruments were validated by using SPSS version 20.0 for windows. The value of Person Correlation for each instrument was between 0.438 to 0.519, and 0.410 to 0.547 with valid category.

Reliability tests were also conducted on instruments to measure scientific approach implementation, and employability skills reinforcement. Reliability testing involved 54 students who were asked to complete 30 questions that had previously been validated. A score of 54 students was then tested using Cronbach's alpha with the help of Statistical Package for Social Sciences (SPSS) version 20.0 for Windows. Reliability test showed that the Cronbach's alpha value for the scientific approach implementation was 0.747, and 0.791 for the employability skills reinforcement. Both values were greater than 0.6. Therefore, both instruments were considered reliable. Both instruments for scientific approach implementation and employability skills reinforcement were valid and reliable to be used to collect research data

Data analysis

Data in this study were tested for their for homogeneity, normality and linearity before they were analyzed using descriptive analysis, regression analysis. The data analysis of the data was performed with the help of SPSS version 20.0 for Windows. The application of descriptive analysis was conducted to determine the variable characteristics of the scientific approach implementation and employability skills reinforcement. The regression analysis was used to determine the influence and contribution of the scientific approach implementation to employability skills reinforcement.

Prerequisite test

The prerequisite test which was performed before regression analysis consisted of homogeneity test, normality test, and linearity test. The data homogeneity test results with α: 0.5 with numerator df (n-1, where n = 120), and denominator df (n-1, with n equal to 120) showed F stat: 1.146, and F table : 1.35 . Because F count < F table, then the data had the same variance (homogeneous).

The results of normality test data using Kolmogorov-Smirnov showed the Sig. Kolmogorov Smirnov = 0.200>α = 0.05, the conclusion is that the data on scientific approach implementation and employability skills are normally distributed. The linearity test results showed the F value was fit (Deviation from linearity is 1.145 with significance 0.311 above 0.05) so that linearity requirements were met.

Stages of Learning with Scientific Approach

Planning

The planning stage of learning process with employability skills reinforcement for vocational school teacher candidates was conducted in the following steps;

1. The lecturer prepared the learning documents; semester learning plan; teaching materials, learning media.
2. The lecturer chose a car body's electrical system practice course that was used in conducting research.

3. Vocational teachers and prospective teachers understood the curriculum that strengthens the mutually agreed employability skills of vocational teacher candidates.
4. The vocational school teacher candidate understood the competencies that was applied in learning according to the content of the Automotive Engineering Education Study Program's Curriculum.
5. In this context attitude/affective indicators are taken from the formulation of *employability skills* that already exist in the curriculum consisting of *Effective Relationships* (K1) , *Workplace Skills* (K2) , and *Applied Knowledge* (K3)
6. The selection of the value of employability skills to be developed in vocational school teacher candidates is used as a basis for determining learning and assessment activities.
7. Prepared the assessments; test questions, questionnaires, and observation sheets.

Implementation

The learning process which used the scientific approach was carried out in three stages: (1) preliminary activities; (2) core learning activities; and (3) closing activities. Preliminary activities were carried out by giving orientation to vocational school teacher candidates about the learning material to be delivered, it was continued to provide motivation, apperception, giving references.

The core learning activities were carried out according to the steps of the scientific approach including observing, questioning, experimenting, reasoning (associating), concluding, and communicating (5M) (Utanto et al., 2017) . 5M was applied using ICT-based media and applied the learning technique / method based on students' activities that are fully illustrated in table 3.

Closing activities were carried out by (1) making a summary / conclusion of the lesson by involving the teacher candidate; (2) checking the completion of the tasks; (3) providing feedback and direction / motivation; (4) Delivering follow-up on learning and remedial/enrichment services; (5) Informing the material / tasks of the next meeting; (6) closing the lesson with greetings

Table 3
The stages of the implementation of learning process with a scientific approach

Scientific Learning Stages	Learning Activities	Competencies	Assessment	Objective
Observing (M1)	The teacher candidate observed the demonstration of the learning object to understand the object of learning	Knowledge, affective aspect, and skills of the teacher candidates to the components of employability skills; K1-1, K1-2, K2-1, K2-2, K2-3, K2-3, K2-4, K2-5, K3-1, K3-2.	Knowledge: test on their understanding of the learning material Affective aspect: Observation sheet skills: observation sheet	Assessing the completion; knowledge, affective aspect, and skills to the components of employability skills included; K1-1, K1-2, K2-1, K2-2, K2-3, K2-3, K2-4, K2-5, K3-1, K3-2.
Questioning. (M2)	The teacher candidate poses questions about the learning object from the factual question to the hypothetical questions, creates a concept of employability values with the guide of the lecturer			
Gathering information (M3)	The teacher candidate determines the information based on the questions, determines the source of information and gather the information from various sources both online and offline			
Associating. (M4)	The teacher candidate analyses the information by categorizing, determines the relationship of the category information/category and concludes the information based on the analysis			
Communicating. (M5)	The teacher candidates communicate the results of their work by spoken and written media using diagram, chart or other media. They reflect on the employability skills			

FINDINGS

The Description of Scientific Approach Implementation Data

The data on the implementation of scientific approach were revealed by questionnaire consisting of 30 items in the four scale (1 - 4). A minimum score for the scientific approach implementation variable was equal to 30, the amount of the maximum score was 120, and the mean criterion $(\bar{X}\ k)$ was 75. The results of the research data showed that the minimum score was 74, the maximum score was 108, the mean score was 92.26, the median score was 92, the mode was 95, and the standard deviation was 6.15. By using the mean score of the criteria ($\bar{X}\ k = 75$), The mean score of the research data was 92.56 ($\bar{X} = 92.56$). In general, all students in Automotive Engineering Education Department, Faculty of Engineering, Semarang State University perceived the implementation of scientific approach in electrical and air conditioning systems were categorized as very high. Only 6.67 % of students perceived the implementation of the

scientific approach in the moderate category, 74.17 % in the high category, 19.16 % in the very high category.

Table 4
Data on strengthening of vocational teacher candidtes' employability skills

Component	Effective Relationships (K1)		Workplace Skills (K2)					Applied Knowledge (K3)	
	K1-1	K1-2	K2-1	K2-2	K2-3	K2-4	K2-5	K3-1	K3-2
Sum	412.0	391.0	393.0	402.0	423.0	462.0	386.0	344.0	378.0
Max	5.0	5.0	5.0	5.0	5.0	6.0	5.0	5.0	5.0
Min	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Average	3.4	3.3	3.3	3.4	3.5	3.9	3.2	2.9	3.2
Median	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Mode	3.0	3.0	3.0	3.0	4.0	4.0	3.0	3.0	3.0
Stdev	0.6	0.7	0.7	0.7	0.8	0.9	0.8	0.7	0.9
Varians	0.4	0.5	0.5	0.5	0.7	0.7	0.6	0.6	0.8

Note: K1-1: Interpersonal skills, K1-2: Personal quality, K2-1: Resource management, K2-2: The use of information, K2-3: Communication skills, K2-4: Systems thinking, K2-5: Use of technology, K3-1: Applied academic skills, and K3-2: Critical thinking skills.

Description of Employability Skills Reinforcement Data

The variable on employability skills reinforcement of the teacher candidates at vocational school was revealed by the questionnaire. The questionnaire consisted of 30 items in a scale of four (4). The minimum score was 30, the maximum score was 120. Therefore, the mean criteria ($\bar{X}k$) was 75. The results of the research data showed that the minimum score of the employability skills reinforcement was 68, the maximum score was 101, mean score was 90.49 , median score was 92.0, mode was 95, and the standard deviation was 5.71. The percentage of employability skills of students as the vocational teacher candidates in Automotive Engineering Education which were categorized as low was 0.83, the moderate category was 6.67%, higher category was 73.33%, and 19.17% was on the very high category.

If it is classified, the data for strengthening employability skills for prospective vocational teachers in each component, i.e. (1) *Effective Relationships* (K1), (2) *Workplace Skills* (K2), and (3) Applied Knowledge (K3), (table 4).

Hypothesis testing

The SPSS output was a regression model: $Y = 49.438 + 0.445\,X + \varepsilon$, at the significance level $\alpha = 5\%$, the null hypothesis was rejected because the sig (0,000) < α (0.05). It can be concluded that the variable X 'learning with a scientific approach' had a significant effect on Y 'the reinforcement of the employability skills of vocational schools teacher candidates'.

F test (model fitness test)

By using SPSS ANOVA, Conclusion on the significance level of 5%, HO was rejected, because the value of sig (0.000) <α (0.05), then the model was fit.

The coefficient of determination (R^2) and correlation coefficient (R)

Correlation coefficient was R = 0.476 means that there is a relationship between the implementation of scientific approach learning process during electrical in car body and air conditioning systems and employability skills reinforcement on vocational school teacher candidates vocational school teacher candidates in automotive engineering program with valid and reliable indicators of 22.7 % (table 5). The coefficient of Determination value (R Square) was 0.22. Therefore, the contribution of the scientific approach implementation in reinforcing the employability skills was 22.0 %, while the remaining percentage of 78 % is influenced by other factors.

Table 5
The coefficient of determination and correlation

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.476[a]	.227	.220	5,053	.227	34,640	1	118	.000

a. Predictors: (Constant), Scientific approach

b. Dependent Variable: employability skills reinforcement

DISCUSSION

Learning Planning

Lecturers developed a semester learning plan with employability skills. The semester learning plan with employability skills was written through the formulation of learning objectives, the selection of learning method, the development of learning scenarios, and the development of learning instruments with employability skills. The formulation of learning objectives was performed by including the employability character indicators and audience, behaviour, condition, degree *(ABCD)* components.

The learning material on car body's electrical system practice was a module which contained the flow diagram on the learning material; electrical lighting systems; central lock; power window; and door lock. The vocational teacher candidates read and understood the flow chart carefully, recognized the characteristics of the car body's electrical system, performed trouble shooting, and repaired the possible damages. In this example, vocational teacher candidates read and understood the images carefully was one formulation of communication skills from employability skills as intended by *BCA / ACCI, 2002*. The learning method with employability skills can be selected from a variety of learning methods that have the main characteristics to make students active in learning process. Therefore, in addition to being effective in achieving hard skills competencies, the vocational school candidate can also strengthen their employability skills.

Learning scenarios for employability skills were developed from pre-selected learning method such as; the group work method, the project method, and the discussion. Learning scenarios in the form of lecturer teaching activities and learning

activities of prospective vocational teacher were organized in the stages of opening activities, core activities, and closing learning activities. The learning assessment was developed in the form of a booklet test to assess cognitive knowledge on the program of Automobile electrical system courses, and air conditioning systems, observation sheets to observe the behaviour (employability skills) of the vocational teacher candidate, and self-evaluation sheet to allow any prospective vocational teachers reported learning activities related to the development of their employability skills.

Learning Implementation

The scientific approach to learning is similar with the scientific method, or the scientific model commonly used in science learning (Longbotham & Longbotha, 2006; and Keyes, 2010). Implementation of scientific approach was carried out by applying these following steps: Observing, Questioning, Gathering information / experimenting, Associating / processing information, Communicating (5M) as shown in table 3.

The implementation of a scientific approach to learning can strengthen the employability skills of vocational teacher candidates in the Automotive Engineering Education study program. The learning process was carried out in these stages; (1) group learning made the vocational teacher candidates felt more confident and comfortable; (2) the stages of observing strengthened them to be more motivated and increase their curiosity; (3) the stage of experimenting / gathering information made vocational teacher candidates more comfortable to gather information that can be performed together, exchanged ideas and experiences; (4) stages of associating, adding breadth and depth to information by processing information by seeking solutions from various sources; (5) communication stage, vocational teacher candidates were trained to convey the results of learning by reporting and presenting to the class. This is in line with the integrated productive practice management model (momantikproter) developed by Hadromi (2015). Hadromi (2015) argued that the application of momantikproter provides opportunities for teaching staff; participants learned to have an integral understanding of practice material, and have implications for increasing motivation to optimize their potential. These steps are steps in strengthening the employability skills of vocational teacher candidates.

The results showed that scientific approach learning had a significant effect on the strengthening of employability skills of prospective vocational teachers (table 5). The contribution of scientific approach to strengthen employability skills was 22.0%. This is possible because the scientific approach to learning involves vocational teacher candidates directly to associate learning material in real life contexts (In'am & Hajar, 2017; Stephenson & Sadler-McKnight, 2016). The association of the lessons with real life context in learning makes vocational teacher candidates more creative, innovative, and are able to bring out brilliant ideas in solving problems they face (Bandaranaike, 2018). The creativity of teachers candidate grows because learning is centered on students. Professors to act more as facilitators and allow students to take greater responsibility for their own education and increase the levels of interactive education (Khorbortly & Budnik, 2014). It appears that as the children had more time to engage with the material, participate in cooperative peer discussions, and receive

encouragement from their teachers to provide elaborated feedback to each other (Gillies, 2015), so that it could strengthen the employability skills of vocational teacher candidates (Stephenson & Sadler-McKnight, 2016; Rosenberg et al, 2012).

The sequence of employability skills components from the largest to the smallest is as follows: K2-4, K2-3, K1-1, K2-2, K2-1, K1-2, K2-5, K3-2 and K3-1. This data reveals that strengthening Workplace Skills (K2) and Effective Relationships (K1) are spread evenly at high levels, while the Applied Knowledge (K3) component is spread at lower level. The scientific approach is able to create an atmosphere of active learning, and can make students more creative and innovative in learning the material (Sodik & Wijaya, 2017) supports that the scientific approach in learning process can make the learning atmosphere active and very interesting, because students are confronted with the reality of the material and the facts in their surrounding to increase their motivation to find out more.

Learning Assessment

The implementation of the scientific approach required understanding and creativity of the lecturer in presenting the material with the scientific approach. Scientific approach has advantages and disadvantages (Camuffo et al., 2020). One of the strengths of the scientific approach is that it creates an enjoyable learning situation (Putra et al., 2020; Lyubomirsky, 2008). The lecturer need to pay attention to several factors that influence the success of the learning process. The success of the teaching and learning process is influenced by; the self of vocational teacher candidates as the main actors in the teaching and learning process (Winarso, 2016); the lecturer himself as the manager of the teaching and learning process with all its uniqueness (Kim et al., 2011; Obwogi, 2013); the educational objectives which are the targets of achievement of the teaching and learning process (Singh & Leavline, 2013); learning materials as the main supporting material for the achievement of objectives (Fox, 2000); ease of accessing teaching material resources (Eucheria, 2020); the atmosphere of learning (Said, 2016). From all the descriptions, the lecturer is one of the components that greatly determines the success of vocational teacher candidates in learning and strengthening employability skills . Therefore, lecturers must always try and innovate to find the appropriate strategies, methods, models and approach in learning.

Through learning wit scientific approach, professor, and lecturer become the learning facilitators so that the learning process can take place more effectively to improve the knowledge, skills and attitudes. Darling-Hammond (2015) corroborates that to realize students' cognition requires the teaching of broad skills from the teaching staff. In addition, Orlich et al. (2012) believes that good teaching staff reflects the way in which they will present their lessons and through their education, having various teaching strategies at their disposal (Irmita & Atun, 2018).

CONCLUSIONS

Effective teaching not only involves the use of tools, techniques, and strategies but also the understanding of meaning specifically about how vocational teacher candidates learn, process information, motivate themselves, and pay attention inhibiting

factors in learning. Scientific approach is a learning method that regulates learning in stages that contain instructions for conducting learning to vocational teacher candidates. The application of scientific approach can strengthen the employability skills of vocational teacher candidates. This condition is possible because learning is carried out with the scientific stages. This implementation of the scientific approach in learning could strengthen employability skills with the percentages as follows: the medium category by 6.67%, the high category by 73.33%, and 19.17% in the very high category. The amount of contribution in strengthening employability skills was 22.0%. The application of learning strategies with the scientific approach specifically strengthens employability skills in the components as follows: Workplace Skills (K2) and Effective Relationships (K1) components that spread evenly at high levels of reinforcement, while the Applied Knowledge (K3) component is at a moderate level of reinforcement.

SUGGESTION

The results of this study for educational institutions can enrich the reference of educational institutions in constructing curricula and developing lesson plans to implement the scientific approach to learning. This study revealed that university curricula must be redesigned with more direct industry internships and projects, which could facilitate pre-employment training and improve employment capacity of the graduates

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