THE IMPLEMENTATION TEACHING FACTORY AND IMPLICATIONS ON THE PREPARATION OF CANDIDATES FOR VOCATIONAL HIGH SCHOOL TEACHERS

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Abstract

Purpose of Study: Along with the development of science and technology, significant become preparing qualified graduates in the working world, including for the graduates of vocational senior high school. In accordance with the Law of the Republic of Indonesia No.20 / 2003 on National Education System, the purpose of vocational education is to prepare students to be ready to work in certain fields. Meanwhile, According to Regulation 32/2013 National Standard of Education, the vocational education intended to increase of the intelligence, knowledge, personality, moral, as well as the skills to live independently and to have further education in parallel with previous education.

Based on the direction of vocational education policy as described, Several questions were drawn as follows: 1. What is meant by teaching factory?; 2. What is the teaching-learning purpose of teaching factory?; 3. What benefits will be gained by implementing a teaching factory?; 4. What do the strengths and weaknesses of the teaching factory?; and 5. What are the implications of the Institute of Education and the Workforce, especially in the preparing of vocational senior high school teachers?

Methodology: From the study to the related literature and relevant researches, it can be concluded that: 1The basic principle of teaching factory is the experience integration of working in the school curriculum, where all the equipment, materials and education subjects were designed in order to carry out the production process. This process aimed to produce the goods/services, and reliable and competent graduates. 2 Though there were thirteen performance indicators, many efforts were needed in order to fully implement the teaching factory in Senior Vocational High School environment. According to concepts, objectives and benefits, Including pre14 pairing qualified senior vocational high school teachers; 3. In the evaluation of teaching factory activity in Surakarta, Fajaryati in 2012 found that in terms of learning activities, the implementation of teaching factory was well-run, whereas the aspect of the production process, did not run as expected; and 4. Reorientation and revitalization of the Education and Workforce Education curriculum roommates were in line with the demands of users graduates, especially in the faculty of engineering were required.

Results: Benefits of teaching factory, in principle, is aware of the students, that in the mastery of skills, not enough to just practice soft skills in learning, work in teams, and training interpersonal communication skills, but also have to realize the knowledge directly and exercise work to enter the working world significantly.

Implications/Applications: The basic principle learning factory is the integration experience of working in the school curriculum, where all the equipment, materials and education actors, designed to make the production process in order to produce goods/services, as well as Vocational High School graduates who are competent/reliable.

Keywords: Teaching Factory, Senior Vocational High School, Senior Vocational High School Teacher Candidates

PRELIMINARY

Along with the development of science and technology, the preparation of qualified labor has always been the demands of the world of work, including the preparation of labor Vocational High School graduates. In accordance with Law No.20/2003 on National Education System, that goal is a vocational education prepares students to be ready to work in certain fields. (Law No.20/2003, National Education System National Education System) While according to PP 32/2013 National Education Standards that the vocational education unit aims to improve intelligence, knowledge, personality, moral, as well as the skills to live independently and to follow further education according to vocational (PP 32/2013, About Amendment PP No.19/2005 on National Education Standards).

Development in the field of education is directed at achieving economic growth that is supported by the harmony between...
the availability of skilled manpower and capabilities: 1. Create employment or self-employment; and 2. To answer the challenge of the need for labor. The priorities in the areas of education affirmed again through Presidential Decree 2014 on the duties, functions, and organization of Educational and Cultural Ministry: among them on the need to build a Vocational High School Teaching Factory and Technopark in the Vocational High School with the latest technology. While the Road Map Directorate of Technical and Vocational Education (2010-2014) expects that by 2014 as much as 70% Vocational High School has implemented teaching factory. (Secondary Vocational Directorate-Ministry of Education, 2009)

Based on preliminary as described above, then the problem -Problem formulated as follows: 1. What is meant by teaching factory?; 2. What is the purpose of learning teaching factory?; 3. What benefits will be gained by implementing teaching factory?; 4. How is the implementation of teaching factory? 5. What the strengths and weaknesses of teaching factory?; and 6. What the implications of the implementation of the teaching factory to the Education and Workforce, especially in the preparation of prospective teachers Vocational High School.

THEORETICAL REVIEW

Teaching Factory

According to Lamancusa, John S., Jorgensen, and Jens E., the concept of necessary teaching factory linked to three main factors, namely: 1. of learning are not enough; 2. The competence of learners gained from practical experience directly; and 3. The experience, team-based learning that engages students, faculty and industry participation will enrich the educational process and provide tangible benefits to all parties (Lamancusa and Jorgensen, 1995). The basic principle learning factory is the integration experience of working in the school curriculum, where all the equipment, materials and education actors designed to make the production process in order to produce goods or services.

While Moerwismadhi considers that the teaching factory, right carry on - school production activities or services as part of the learning process, and therefore schools need to have a factory, workshop or other business units (Moerwismadhi, 2009). Correspondingly, the teaching factory is a student in learning activities, through production activities, either in the form of goods or services in the school setting. Goods or services produced, having adequate quality so eligible for sale to the public (Sudiyanto and Yoga, 2011).

The advantage gained can add a useful source of income schools for educational activities. It is clear that the world presents a teaching factory industry / real work in a school environment to prepare graduates who are ready to work. The condition considers that in principle, the concept of teaching factory indescribable as shown in Figure 1 (Rentzos and Chryssolouris, 2014).

![Figure 1: Concept Teaching Factory (Rentzos and Chryssolouris, 2014).](image)

*Teaching Factory* forum, atmosphere, activities, and places of learning that combine school curriculum and tasks of the industry. In the normal teaching factory, there is an interaction between teachers, experts/technicians of the industry, and the students learn to use the tools, instruments, procedures, and ways of working in an industrial environment in real time, in the activities of processing and producing goods or services that are worth selling standards on certain industrial products.

To obtain an optimal learning outcome for students, as well as the goods and or services in accordance with industry standards, teaching factory activity to do with the learning schedule as shown in Figure 2 below.

In contrast, Alptekin, SemaE., Reza, P., and M.C. Quaid describes teaching factory as seen in Figure 3. In the Teaching Factory of Cal Poly, there are at least 5 five. Part or Division namely: 1. Industrial partners; 2. Production Planning and Control Center; 3. CAD Laboratories; 4. Rapid Prototyping Manufacturing Facilities; and 5. Students Graduates.

Teaching Factory in the neighborhood of Cal Poly has a lot of support of several partners from an industry that enables the
implementation of teaching factory can run smoothly, and optimum. Division of Production Planning and Control Center is a part or division in charge of production planning and quality control so that the goods and services produced or always meet the quality requirements and quality in accordance with industry standards.

While CAD Laboratories Division is the division that carried out the tests on the results of the planning of the Division of Production Planning and Control Center, the development of products and or services that are designed and developed, quality always well controlled.

Meanwhile, Rapid Prototyping Manufacturing Facilities Division is a Division in charge of making prototype products and or services that have deranging-developed by the Division of Production Planning and Control Center and has been well tested and well worth the CAD Division Laboratories.

With the organizational structure, management, and delivery of teaching factory, it is expected Teaching Factory of Cal Poly, really can walk, function and useful as a place of learning for the students concerned, in accordance with the existing curriculum, as well as to produce goods or services that are eligible for sale to the consumer society, which is standardized as an industrial product, whether goods or services in general.
Purpose of Teaching Factory

The purpose of teaching factory is that teaching is not simply to pass on what is written in the books, but students have to practice soft skills in teaching, learning and working in teams and trained in interpersonal communication skills so that students gain firsthand experience and practice working to enter the world work.

While the view that the purpose of teaching factory are: 1. Integrate learning in a school environment with industrial environment, through the practice of using work tools, and various instruments that exist in industrial environments; 2. Provides an opportunity for students to practice in order to develop soft skills in their entirety in a real working environment; and 3. The students practice the techno complete from planning, production, and marketing.

While Alptekin, SemaE, Reza, P., and MC Quaidstates that the purpose of teaching factory are: 1. To graduate better professionals by providing leading-edge concepts in modern manufacturing, enabling them to Effectively Compete in today’s industry; 2. To enhance the current curriculum that will focus on modern manufacturing concepts; 3. To demonstrate viable solutions to the dynamics of technological challenges across the entire integrated business enterprise; and 4. To the transfer of technology and information from and to partner companies as well as local companies, with student activities, team projects and senior projects as the primary vehicle (Alptekin et al., 2016).

The purpose teaching factory according to the Directorate of Technical and Vocational Education are: 1. Setting up individual labor; 2. Prepare individuals to continue learning to a higher level; 3. Help students select areas of work according to his ability; 4. Shows that learning by doing is very important for the effectiveness of education and foster creativity; 5. Defines the skills needed in the working world; 6. Expand recruitment opportunities for students; 7. Help students in preparing themselves into the workforce, and how to establish cooperation in the actual working world; 8. Provides an opportunity for students to practice skills thus be able to make decisions about a career that will be selected; 9. Provide an opportunity for teachers to build "instructional bridge" between classes with the world of work (Hadlock et al., 2008); 10. Give an opportunity to broaden instructional teacher; and 11. Makes learning more interesting and motivate students to study harder, in order to achieve good performance (Secondary Vocational Directorate-Ministry of Education, 2015).

Benefits of Teaching Factory

Benefits of teaching factory, in principle, is aware of the students, that in the mastery of skills, not enough to just practice soft skills in learning, work in teams, and training interpersonal communication skills, but also have to realize the knowledge directly and exercise work to enter the working world significantly (Hadlock et al., 2008).

Meanwhile, according to Technical and Vocational Education Directorate that the benefits of a teaching factory are: 1. As a means of production-based training and practice directly to students, which are oriented on the market; 2. Help funding in maintenance, facilities and operational expenses for the education and welfare improvement; 3. Cultivate the spirit of entrepreneurship for teachers and students; 4. Develop an independent attitude and confidence of students through the production process; 5. Establish a better relationship with business and industry as well as other communities (Siswanto, 2010).

Correspondingly, Siswa notes that the benefits of teaching factory are: 1. Give more opportunities to the students to practice their skills in teaching factory activity; and 2. Could have made contributions in enhancing the entrepreneurial spirit by involving students directly in the whole business process from planning, production, and marketing (Prosser and Quigley, 1950).

Implementation of Teaching Factory

From the above explanation can be concluded that the teaching factory is a combination of competency-based learning approach and the production-based learning, where the learning process is done in the real working world by organizing the production of goods and or services. Goods and services produced have a certain quality, and meet the relevant industry standards, so it is worth selling in the consumer society in general.

How much teaching factory could be implemented, in accordance with the intent and purpose, is related to a number of factors that must be met and implemented. Indicators implementation teaching factory according to the DIT. Technical and Vocational Education is included: 1. The learning process expertise or skill that is designed and implemented based on standard procedures and work real job.; 2. The learning setting is made as closely as possible to real work situations; 3. Oriented problem solving; 4. The student or student-centered active learning, independent study individualized learning, and cooperate; 5,6. Learn by doing learning by doing; 6,7. Emphasis on competency achievement of individual students
and the traditional suit specific labor standards; 8,9. Develop soft skills of students, which includes intellectual, emotional, spiritual / social, able to respond to irregularities and damage, responsible within the working environment, to communicate well, build commitment and creativity; 10,11. Train students for continued learning and adapting to new knowledge; 12,13. The dissemination to educators, students, parents and partners about the approach Vocational High School and learning strategies teaching factory; 14,15. Melaksanakan-based learning to pattern of business development in a sustainable manner; 16,17. Clicking organize and prepare the students involved (Fathi and Dastoori, 2014; Lestari, 2014; Nikolaeva and Savinov, 2016); 17,18. Providing guidance and consultation to students individually and team; and 19. Carry out the evaluation and improvement of learning outcomes gradual and continuous, and sustainable (Guerrero et al., 2018; Lobão and Pereira, 2016; m. Safdari et al., 2013).

DISCUSSION

Advantages and Disadvantages of Teaching Factory

As has been explained in the study of theory, that teaching factory is an activity of students in learning by doing production activities, either in the form of goods or services in the school environment, where all the equipment, materials and education actors designed to make the process production with the aim to produce goods or services. This is in line with Law No. 20/2003 on the national education system which states that "vocational education is an education that prepares students to work in a particular field".

In concept, teaching factory is also in line with the theory of Prosser & Quigley which states that vocational schools will be effective if: 1. Environment where students are trained, is a replica of the environment in which they will work; 2. The tasks carried out by way of training, tools, and machines similar to those required in the job; 3. Exercise habits of thinking and working like in the Business World/World Industries; 4. Each individual has an interest, knowledge, and skills at a high level; 5. Every profession, occupation, job for everyone who wants; 6. The work habits and training form the habit of thinking that right repeatedly; 7. Teachers have successful experience in the application of the competency of the operation and the real work processes; 8. The market demand attention to vocational education/signs of the market; and 9. The training given to real jobs are loaded with values.

Thus, the teaching factory has many advantages over conventional learning. More teaching factory provides the opportunity for students to think, practice and work according to their competence in a real working environment. These conditions give greater opportunity, for the achievement of vocational education goal, namely to develop the skills, abilities, knowledge, attitudes, and work habits necessary for students so that they can become skilled workers, useful, productive and reliable.

From the above explanation can be concluded that the implementation of the teaching factory in Vocational High School, has many advantages in order to print a labor candidate Vocational High School graduates who are reliable and productive. Those who learn through teaching factory has had a variety of experience in the working environment, the use of work tools, interpersonal communication in the world of work, habits of thinking and acting in accordance with the demands of the working world significantly.

They have the advantage, has been studied in an integrated environment between the academic world and the industrial world. They have learned the principles Technopreneurship, ranging from design, implement and market a good product/service.

Behind the advantages and benefits of the implementation of the teaching factory, whether the Road Map Directorate of Technical and Vocational Education 2010-2014 are targeting that by 2014 as many as 70% have implemented VOCATIONAL HIGH SCHOOL teaching factory? The target was apparently still a big job to the Directorate of Technical and Vocational Education and its board, let alone there are at least thirteen indicators as a measure of adherence to teaching factory in question.

From various studies that have been conducted, it was found some major hurdles general nature of the implementation of the teaching factory, in antarnya is the poor ability of: 1. Knowledge and competence productive and business schools; 2. The production design; 3. The production management and marketing; 4. Management, capital, and financial management; 5. Sharing and storage; 6. Meddling from outsiders; 7. The integration of learning in production; 8. The spirit of the school community; 9. The use of ICT in the production process and learning; 10. Collaboration between the programs, inter-department and inter-school.

Some studies related to the implementation of the teaching factory, there are some studies, both concerning its advantages
and disadvantages. Lestari in 2014 through the study titled “Effectiveness of Teaching Factory Students Vocational High School Vocational High School in Solo Technopark Surakarta” found that there is some force implementation of teaching factory that is the process of planning, implementation, management and evaluation and documentation already well. While some of the weaknesses in the activities of teaching factory, which was found Lestari, is from the aspect of delay in the production of goods and services over time., due to lack of facilities and the number of new instructors were charged as much as 50% of what it should be.

Somewhat different from some of the findings related to the evaluation of the implementation of the teaching factory in Surakarta, conducted by Fajaryati. In the evaluation, Fajaryati (2012) found that in terms of learning activities, the implementation of the teaching factory has been running well, while for the production process, has not run as expected.

Based on these findings Fajaryati suggest some of the following: 1. Need continued socialization of learning to teach factory, both in the school environment, parents, and community; 2. The introduction of the importance of learning teaching factory in the world of education, industry, and the community in the implementation of the teaching factory support from various parties; 3. Need to be evaluated and improved learning outcomes teaching factory periodically; 4. Need to increase capacity in conducting market research for teachers and teaching factory managers; 5. Need to increase the ability to determine marketing strategies for teachers and teaching factory managers; 6. Should always be the development of market and product distribution network teaching factory; and 7. Need to increase promotion of teaching factory in the consumer society.

It is recognized that there are a lot of dynamics in the organization of the teaching factory in Vocational High School. However, several studies and the study concluded that the implementation of teaching factory to improve the competence of Vocational High School students in a way: 1. Seek any of the students, using the media during the practice; 2. Students are able to produce a quality product; 3. Implement industry standards in product goods/services; 4. The students practice the skills in teaching factory activity; and 5. The students directly involved in the whole business process, from planning, production, and marketing.

Teaching Factory Implementation Implications on the Education and Workforce

Teaching factory, as the process of learning in Vocational High School as described above, can only be created by the student teachers who have been trained in Educational Institutions environment and education personnel. The curriculum in the Faculty of Engineering Education and Workforce Institute during this time, practically not providing an opportunity adequately to the students to practice on teaching factory.

No, the learning environment and Workforce Education Institutions in general as a miniature teaching factory, in order to train students as prospective teachers. These deficiencies, almost perfect, because when taking courses Practice Field Experience PPL in High School Vocational, practically the students just parachuted in-class learning generally taught Mapel that is the theory, with only a modicum of practical activities in the workshop or laboratory.

With minimal training, and just as simple as it is unlikely the students as prospective teachers to design, implement, first evaluate the activities of teaching factory, which now has become a trend and the trend of learning in Vocational High School environment in general.

Thus, there should be reoriented on the curriculum of Faculty of Engineering at Educational Institutions environment and education personnel, so that prospective teacher’s Vocational High School generated, capable of being a teacher eligible for Vocational High School in general. It was not there another way, the better, except by creating a teaching factory in Educational Institutions environment and education personnel.

Implementation of teaching factory in Nanyang neighborhood Polytechnic Singapore, and or Teaching Factory of Cal Poly, as well as Rentzos LA, Chryssolouris G., deserve and need to be replicated in order to reorient curricula in the Faculty of Engineering Educational Institutions environment and education personnel in general.

CONCLUSION

Based on the study of the literature and the results of relevant research as described above, it can be concluded that:

1. The basic principle learning factory is the integration experience of working in the school curriculum, where all the equipment, materials and education actors, designed to make the production process in order to produce goods/services, as well as Vocational High School graduates who are competent/reliable;
2. The purpose of teaching factory are: 1. Preparing individuals to become workers; 2. Prepare individuals to continue learning to a higher level; 3. Help students choose a field of work according to his ability; 4. How to establish cooperation in the actual working world; and 5. Provide an opportunity for teachers to build a ‘bridge instructional’ between classes with the world of work;

3. Benefits of teaching factory, in principle, is aware of the students, that in the mastery of skills, not enough to just practice soft skills in learning, work in teams, and training interpersonal communication skills, but also have to realize the knowledge directly and exercise work to enter the working world significantly;

4. With thirteen indicators of enforceability, it still needs a lot of effort in order to carry out a full teaching factory in Vocational High School environment, in accordance with the concept, objectives, and benefits, including the preparation of prospective teachers trained Vocational High School Educational Institutions And of educational personnel;

5. Some studies have found that the management and delivery of teaching factory to upgrade the competence Vocational High School students in several ways as follows: 1. Seek one student, one medium at the time of the practice; 2. Students are able to produce a quality product; 3. The students apply the existing standards in the industry; 4. The students practice procedures, and standards of skills relevant to their expertise in teaching factory activity; and 5. Improving the entrepreneurial spirit of students directly in the overall business process, from planning, production, and marketing;

6. To obtain optimum results in the implementation of the teaching factory, then it needs to be done: 1. Dissemination of the learning-teaching factory; 2. Evaluation and improvement of learning outcomes teaching factory periodically and sustainable; 3. An increased ability to do market research, marketing strategy, and the development of market network for teachers and teaching factory managers; 4. Increased promotion of goods and or services, the results of teaching factor among the consumer public in general;

7. Be required reorientation and revitalization of the curriculum Educational Institutions and Education Personnel especially in the Faculty of Engineering FT in line with the demands the graduates and the world of work in general, especially associated with the tendency for the management and implementation of curriculum teaching factory according to the prevailing Vocational High School environment in general.

8. Implementation of teaching factory in Nanyang neighborhood Polytechnic Singapore, and Teaching Factory of Cal Poly, as well as Rentzos LA, Chryssolouris G., deserve and need to be replicated in order to reorient curricula in the Faculty of Engineering Educational Institutions environment and education personnel in general.

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