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Implementation of Chemical Engineering Vocational Teacher Internship in Industry: A Multi-case Study at PT. Petrokimia Gresik and CV. Tirta Amara Mahesa

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ABSTRAK

Abstract: Vocational high schools aim to produce graduates with work-ready skills (supply and demand driven). However, the fact that VHS still contributes the most to unemployment is a concern. Teacher internships are an important program to increase teacher competence through industrial experience. This research seeks to discover how the industry can implement a productive teacher internship program for Chemical Engineering Expertise. The research method is case study qualitative including interviews, observations, and documents. The results showed that the teacher internship program in terms of supporting and inhibiting factors, and impacts at PT. Petrokimia Gresik. The developed a month-long teacher apprenticeship model from the Ministry of Industry, as well as field observations (plant tours) and competency schemes for the Cooling Tower Water Treatment utility system. Assessor LSP-P3 Indonesian Fertilizer Industry BNSP competency test Tirta Amara Mahesa follows the school's teacher apprenticeship model for one week directly in the drinking water treatment process based on the needs of the pilot school teaching factory program.

Abstrak: Sekolah menengah kejuruan bertujuan untuk menghasilkan lulusan dengan keterampilan siap kerja. Namun, fakta bahwa SMK masih memberikan kontribusi terbesar terhadap pengangguran menjadi perhatian. Magang guru merupakan program penting untuk meningkatkan kompetensi guru melalui pengalaman industri. Penelitian ini berusaha untuk mengetahui bagaimana industri dapat melaksanakan program magang guru produktif untuk Keahlian Teknik Kimia. Metode penelitian yang digunakan adalah studi kasus kualitatif meliputi wawancara, observasi, dan dokumen. Hasil penelitian menunjukkan bahwa program magang guru ditinjau dari faktor pendukung dan penghambat serta dampak pada PT. Petrokimia Gresik. Pengembangan model magang guru selama sebulan dari Kementerian Perindustrian, serta observasi lapangan (wisata pabrik) dan skema kompetensi untuk sistem utilitas Pengolahan Air Menara Pendingin. Asesor LSP-P3 Uji kompetensi BNSP Industri Pupuk Indonesia Tirta Amara Mahesa mengikuti magang guru sekolah model selama satu minggu langsung dalam proses pengolahan air minum sesuai kebutuhan program teaching factory sekolah rintisan.

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INTRODUCTION

One of the VHS's difficulties is the assumption that graduates currently account for the majority of unemployed, as demonstrated by data from the Central Statistics Agency (BPS). anticipated the unemployment rate would be 9.77 million in August 2020. The majority of the unemployed were graduates or vocational high school (VHS) graduates. The open unemployment rate for graduates of technical schools is 13.55 percent, while the figure for graduates of secondary schools is 9.86 percent (BPS, 2020). The statistic is consistent with data from the Central Statistics Agency (BPS) of East Java Province, which indicates that when looking into the workforce in August 2020 by education level, TPT for Vocational High Schools (VHS) continues to dominate other education levels, accounting for 11.89 percent (BPS Province of East Java, 2020).

Vocational High School (VHS) is a formal educational institution that strives to generate graduates with competent skill competencies that meet the expectations of the workplace (supply and demand driven). According to the 2004 curriculum part 1 of the Ministry of National Education, one of the specific objectives of VHS is to prepare graduates to be productive human beings capable of working independently and filling job vacancies in the business and industrial world as workers with the appropriate expertise competencies.

To accomplish VHS's aims and purposes, the VHS curriculum is implemented in such a way that the specified outcomes are achieved. According to VHS's mission, graduates should be able to: 1) enter the workforce and develop a professional attitude; 2) choose a career, be competent, and develop themselves; 3) become a middle-level workforce capable of meeting the business and industrial world's current and future needs; and, 4) become a productive, adaptive, and creative workforce. As a result, Vocational High Schools must provide infrastructure that enables students to refine their skills and abilities in order to meet the expectations of industry and the actual world of labor. Sudjimat & Sunardi, 2016).

UNESCO (2010) makes a distinction between skills (skill) and competence (competence) (competence). Skills are the necessary information and expertise to perform a certain work or job, or they are the result of education, training, and experience related to "know how" (know-how) that is distinctive of technical knowledge. While competence refers to an individual's capacity to use acquired knowledge, skills, and abilities in order to meet job objectives.

To enhance the quality of vocational education, teachers must enhance their competency, particularly their professional competence, and their ability to solve difficulties that arise while working in industry. Budiman (2014) asserts that continuous professional development activities can be used to enhance the human resources of professional VHS teachers. Continuous professional development is accomplished through the following methods: (1) industry experience, (2) technical competency testing, (3) on-the-job training, (4) involvement in professional associations, (5) continued academic education, (6) provision of professional allowances, and (7) financial support for all professional development activities.

It is mandated to increase the quality of human resources, particularly instructors and education personnel, pursuant to the President of the Republic of Indonesia's Instruction No. 9 of 2016 on the Revitalization of Vocational High Schools. As a result, the industrial experience practice program for teachers is pertinent. This curriculum demands instructors to have expertise relevant to the modern workplace and attempts to increase teacher professionalism in the classroom. The teacher's industry experience is critical in the process of imparting knowledge to students. Teachers with prior industrial experience will understand how the contemporary industrial world is evolving and will be able to adapt to learning in vocational schools. Additionally, it is planned that the knowledge and skills imparted to participants are current and relevant to the industrial world's development, which is why it is critical for VHS to execute a teacher apprenticeship program in industry. Teachers who have received experience through internships in industry can introduce their pupils to the work environment and work processes seen in industry (Usep, 2017)

Certain countries require teachers to complete internships. Additionally, the government of this country provided support for the program by providing a platform. Germany is one of the countries that mandate teacher apprenticeship programs. The German state compels prospective teachers to complete an internship program in industry prior to beginning their careers. After completing various stages and formally becoming a teacher, teachers in Germany are still required to participate in an industry-based teacher apprenticeship program to further develop their professionalism, as stated by (Bauer, 2007).

Another country that encourages teacher apprenticeship programs is China, where vocational teachers are required to complete a one-month internship in the sector each year. It strives to enhance teachers' experience and professionalism. Additionally, vocational teachers in China spend half of their time after school working in industry (Kuczera & Field, 2010).

Additionally, Japan has created a teacher apprenticeship program to bolster its professional licensing. A teacher in vocational education and technology must complete professional development training in the form of in-service or in-service training during their first year as a teacher, as well as an internship or internship training in industry. This is done to ensure that vocational education and technology teachers educate students for work while also transferring their work experience through teaching content and methodology. (2007) (Terada).

Teacher internships in Indonesia are classified as follows: 1) independent teacher apprenticeship models developed by schools, 2) teacher apprenticeship models developed and refined by BMTI P4TK Bandung, and 3) domestic teacher apprenticeship models developed and refined by the Ministry of Industry's Education and Training Center (Sabon S. et al, 2020).

Given the significance and breadth of the benefits associated with this teacher apprenticeship program, schools must provide facilities and support for productive teachers to participate in rotating teacher apprenticeships. Additionally, schools should interact more with industry to give opportunities for teacher internships. Teachers who have completed a teacher apprenticeship program in industry are anticipated to have a high level of professionalism and will be able to adapt learning in vocational schools to industrial advances. Vocational students who are taught according to industry standards will possess enhanced competencies and will be better prepared to enter the workforce. This is consistent with the opinion expressed by (Muhson et al., 2012). The research concludes that it is critical to have relationships with both private and public sector organizations in order to facilitate graduates' integration into the workforce.

Given the importance and magnitude of the benefits of the teacher apprenticeship program in industry, the researchers desired to learn how the teacher apprenticeship program was implemented in the Chemical Engineering expertise program and the Industrial Chemistry expertise competency at VHS Negeri 1 Boyolangu.

METHOD

The purpose of this study is to ascertain how the productive teacher apprenticeship program in the Chemical Engineering Expertise Program is implemented in industry. The research facility is located at VHS Negeri 1 Boyolangu, and the industry partners are PT. Petrokimia Gresik and CV. Tirta Amara Mahesa, both of whom are members of the Chemical Engineering Expertise Program (TAM). The research strategy used is a qualitative case study technique. Qualitative research is a method of inquiry that reflects a naturalistic (phenomenological) perspective. Qualitative research places a premium on the researcher as instrument. Qualitative research is a method based on postpositivism that is used to examine the condition of natural objects (as opposed to experiments), in which the researcher serves as the primary instrument, data sources are purposively, and snowball sampled, data collection techniques are triangulation (combined), data analysis is inductive/qualitative, and qualitative research results emphasize meaning over generalization (Sugiyono, 2009). The case study design was chosen because it is well-suited for revealing a problem with unique or distinguishing characteristics. Qualitative research, on the other hand, is an excellent method for revealing complex cases.

Two industry informants (Training & HR Development staff and Head of IB Factory as instructors at PT. Petrokimia Gresik, as well as the director and operational manager of CV. Tirta Amara Mahesa) and two school informants (Deputy Principal for Curriculum, Head of Chemical Engineering Expertise Program, and teachers who conduct internships in industry) participated in the research. Techniques for data collection include interviews, observations, and documentation. The data analysis process is comprised of the following steps: data collecting, data reduction, data presentation, and conclusion drawing. Validating the data's credibility through the use of triangulation procedures and approaches. According to Sugiyono (2011), triangulation is a data collecting technique in which researchers employ multiple data collection strategies to get data from the same source simultaneously, particularly participatory observation techniques, in-depth

interviews, and documentation studies. Additionally, triangulation can be regarded as a data collecting approach that combines many data collection techniques from existing data sources.

RESULT AND DISCUSSION

The research findings on the implementation of vocational teacher internships in the Chemical Engineering expertise program are summarized in two explanations for the two industries represented by the teacher apprentices, PT. Petrokimia Gresik and CV. Tirta Amara Mahesa (TAM). According to the research focus, teacher apprenticeship implementation consists of five stages: planning, implementation, evaluation, supporting and inhibiting factors, and the impact obtained from the implementation of the productive teacher apprenticeship program in the Chemical Engineering expertise program in industry.

Planning Stage

Technological advancements in the sector have occurred at a breakneck pace. When compared to the development of science in vocational schools, this advancement is hundreds or even thousands of times greater. This is the rationale for believing that VHS must improve and accelerate in order to catch up. Numerous initiatives are taken and implemented to level the playing field between vocational schools and industry. The Director General of Vocational Studies' most recent initiative is the connect and match package concept. This program comprises curriculum alignment activities, guest lecturers from mentors/experts/industry experts, teacher and student internship programs in industry, competency certification for graduates from industry, a promise by industry to absorb graduates, and bridging programs (technology and process upgrades).

The industrial teacher internship program is designed to enhance the knowledge and skills of instructors who would then impart knowledge to pupils. Prior to establishing a teacher internship, numerous requirements must be completed by the activity's three primary components, namely teachers, schools, and industry. Schools select apprentice instructors in two ways. The first is the school's will, with mapping focused mostly on industry-specific competencies. In particular skills, where the teacher is required to share knowledge with pupils or where there is interest in the pioneering Teaching Factory/Tefa school program, the instructor will be assigned to an industry internship. The second is that teacher internships are conducted on the teacher's own initiative, either by selecting their own industry in response to the need to improve the teacher's competence in the productive subjects being taught or by enrolling in an internship program sponsored by the Ministry, Directorate, or industry. Internships are suggested to schools, and schools give licensure and other support services to enable instructors to participate in internships. Thus, the introduction of teacher internships allows instructors to exercise greater autonomy as a means of self-development and professional competence. Internships are suggested to schools, and schools give licensure and other support services to enable instructors to participate in internships. Thus, the introduction of teacher internships allows instructors to exercise greater autonomy as a means of self-development and professional competence. Internships are suggested to schools, and schools give licensure and other support services to enable instructors to participate in internships. Thus, the introduction of teacher internships allows instructors to exercise greater autonomy as a means of self-development and professional competence.

Throughout the internship at PT. Petrokimia Gresik, instructor competence in accordance with the studied competency scheme will significantly aid the learning process. Teachers with comparable competency combined with adequate teacher preparation will facilitate the process of knowledge absorption and knowledge transfer during internships. According to industry research on teacher competence, teachers in Chemical Engineering Vocational Schools must come from other disciplines such as biology or the Indonesian language and teach Chemical Engineering as well as complete internships in industry. Teachers with such issues face barriers and difficulties acquiring competences during industry internships.

It also demands extra attention on the curriculum side, particularly for instructors who serve as assistant teachers during apprenticeships. The instructor must research and create the curriculum for VHS. Because an expert in industry is rarely active in the world of education, he has a limited awareness of the present vocational curriculum, particularly the competency scheme that will be his area of responsibility throughout the teacher apprenticeship program in industry.

The second component is that schools have typically partnered with industry to ensure that information about industry programs is communicated to schools more rapidly. To achieve industry

cooperation, schools must continually strive to win competitions and competitions against other schools in order to earn industry's sympathy and trust for cooperation programs. Naturally, the industry has criteria for which vocational schools will be invited to collaborate, vocational schools with a solid reputation and track record of success, so that the industry is prepared to cooperate and expand cooperation even in the business sector.

Industry is the third component. The primary criterion for selecting an industry in the context of VHS-industry collaboration is similarity of expertise between VHS and industry. As with PT. Petrokimia Gresik, this is an industry that processes fertilizers and manufactures chemicals in accordance with the competences acquired through the Chemical Engineering Expertise Program. The second criterion is that the industry must be lawful, have a legal entity, and be significant, a multinational corporation, or one of Indonesia's state-owned firms. This is consistent with Sutikno and Fitri's (2017) assertion that the prerequisites for industries to become partners in collaboration are that they must be legal enterprises, have and enforce worker protection rules, use explicit work contracts, and ensure the safety of their workers.

As is the case with PT. Petrokimia Gresik VHSN 1, Boyolangu is one of the encouraged vocational schools that has collaborated on curriculum synchronization, industrial visit activities, and equipment help from industry. The teacher internship is a result of the teamwork. The Ministry of Industry, in collaboration with PT. Petrokimia Gresik, is the implementing institution for the Vocational Revitalization program, which is based on Presidential Instruction No. 9 of 2016, and involves the establishment of an apprenticeship program for teachers based on the competency scheme used at PT. Gresik Petrochemicals. Chemical Engineering (Industrial Chemistry and Analyst Chemistry), machinery, and industrial automation are all examples of competency frameworks used in the implementation of teacher apprenticeship programs.

The industry informs the school about the teacher apprenticeship program, and the school determines the teacher to be dispatched based on the requisite criteria, notably the teacher's competence in the subject being taught. The school then sends a list of teachers who will be assigned to industry, and the industry responds with an official invitation letter inviting the school to participate in the teacher internship program in industry. The official invitation letter contains points of agreement regarding the implementation of teacher apprenticeships, including the following: 1) the number of teachers who will intern, 2) the duration of the internship, including the start and end dates, and 3) the cost of the teacher apprenticeship, including the funding split between VHS and industry. According to the researcher's findings, the Ministry of Industry and PT finance training, housing, and consumption.

While on CV. Tirta Amara Mahesa (TAM) is a manufacturer of mineral water and bottled drinking water under the Excell brand and is one of the main employers in the Tulungagung area. Cooperation with vocational schools began with curriculum alignment, student field work practices (PKL), and pioneering the Teaching Factory (Tefa) program for school-based drinking water purification. It has now expanded to include teacher internships. Teacher internships are implemented through school programs; teachers who are sent for internships are those who teach subjects that require expertise in drinking water treatment and who operate their school's Tefa. Transportation for teachers is financed through school funds.

Diverse parties' support for teacher internships in the form of finance programs significantly aids implementation. The government, the community/Dudika, and schools are all stakeholders in providing education who contribute to the program's implementation. According to Wiko Saputra et al. (2015), the components of the cost of education are often assessed using actual expenses, whereas opportunity costs are unpaid costs.

Implementation Stage

Teacher internships are implemented in accordance with the industry's work culture, beginning with effective days, working hours, and manufacturing employee shifts. It is held for one month in Petrokimia, and teachers are fully immersed in the business, utilizing a variety of learning techniques, including classical learning for theory, practice with direct observation of manufacturing plants, and finally, a competency test. Tirta Amara Mahesa's internship will last one week, Monday through Saturday from 08.00 to 16.00 WIB. This suggests that apprenticeship teachers are implemented in industry for a defined period of time; this is consistent with Miharja and Ghani's (2017) assertion that the program is productive for vocational teachers for one month.

Teacher internships at PT. Petrokimia Gresik begin with traditional classroom instruction in basic theory about manufacturing processes, corporate management, and industry work culture. Additionally, participants are placed in the factory to learn Process Flow Diagrams (PFD) and Piping & Instrument Diagrams (P&ID) from the teacher who is accompanying the intern and observing at the manufacturing plant. During the internship, apprentices are subjected to a learning process based on their competency plan using the ATM method (Observe, Imitate). and Modifications) or observe in the first week, then learn and practice Process Flow Diagrams (PFD) and Piping & Instrument Diagrams (P&ID) with the assistance of instructors in the second week. This is accomplished via mingling, conversing, and collaborating with firm employees, as well as by performing work and acquiring knowledge about technical work in the industry. According to Hadam (2017), in the teacher internship program, vocational teachers can interact directly with employers to gain an understanding of the competencies required in the workplace, enabling teachers to teach their students more effectively and in accordance with the competencies required by the industrial world.

Chemical Engineering processes in industry are complex and extremely difficult, making a one-month internship a relatively short period of time to understand the content thoroughly. Years are required for an employee/operator in a manufacturing company to become proficient in their field or to become a professional. Thus, using the teacher's internship time, the industry developed a one-month lesson for teachers by providing simple materials, namely the utility competency scheme in Cooling Tower Water Treatment via Process Flow Diagrams (PFD) and Piping & Instrument Diagrams (P&ID). class room and field observation (plant tour).

Process at PT. Petrokimia Gresik includes Plants I, II, and III which consist of production plants for urea, ammonia, sulfuric acid, phosphoric acid, utility units (Cooling Tower, Demint Plant), turbine system and others. Competency scheme in the field of Chemical Engineering at PT. Petrokimia Gresik covers every existing production process. When a teacher apprentices in industry, he or she will study one competency scheme with one LSP IPI competency test, so that if the teacher wants to study more than one competency scheme, he or she can do several internships in industries with different competency schemes. This is in line with what Rahayu & Ramadhani (2020) said that during job training,

Almost the same thing also happened to CV. Tirta Amara Mahesa. The processing and production of bottled drinking water has a fairly high complexity coupled with the use of a set of process equipment with the latest technology. Excell's bottled water production has undergone repeated efforts and quality tests that are constantly being improved. It takes a long process, effort, and years for the industry to reach standards and quality at this level. Starting from the quality standards of certified drinking water from Suchofindo, standard packaging for glass, bottles and gallons, packaging processes, waste handling, everything must be in a sterile position.

What the teacher has mastered about the principles of water treatment in theory is very limited if the teacher studies the processes and technologies that exist in the industry. Teachers need more time to learn to be able to master the concepts, application of processes and technology for processing bottled drinking water like those in the industry. In the process of pioneering the teaching factory, the assistance of experts from the industry is very much needed in the context of the implementation and production operations.

Transfer of knowledge and knowledge in internship activities in order to improve the professionalism of productive vocational teachers with guidance, direction and guidance by accompanying instructors. This is in line with Usep (2017) which states that professional assistance to improve teacher competence is monitored and the success of the internship program implemented. Likewise, the methods of Hansman, Chaterine A. (2001) are modeling, approximating, scaffolding, self-directed learning and generalization. Modeling, observation of apprentices on the performance of an activity by experienced personnel, approximating, participants observing by imitating the actions of the instructor with close guidance. Scaffolding, apprentices start working to do something according to what was taught. self-directed learning, Interns try real Action in the given task. Generalization, apprentices realize what they have learned, apply skills and grow in the field.

While Collins et al. (Feng-Kwei Wang, and Curtis J. Bonk, 2001) stated that there are six cognitive apprenticeship learning methods, namely: modeling, coaching, scaffolding, articulation, reflection and exploration where modeling is an activity to observe the problem solving process of an expert. to assist in the form of guidance, scaffolding, feedback, modeling, goal setting and task execution. Scaffolding teachers provide support to students on the part of students having difficulty carrying out the task. Articulation requires students to explicitly express knowledge, reasoning and problem solving processes or issues they are dealing with.

Another theory developed by Lev Vygotsky (2010) states, there are at least four basic principles of learning, namely: the sociocultural of learning, emphasis on the socio-cultural nature of learning, zone of proximal development, zone of proximal development, cognitive apprenticeship, cognitive apprenticeship and scaffolding. Cognitive apprenticeship is a process where a person learns step by step to gain expertise in his interactions with other people who have more expertise or experts who have mastered the problem.

Cognitive apprenticeship is one way for teachers to improve skills, knowledge and good attitudes, according to competency needs. Learning step by step for a teacher is not only obtained in formal education but can be done by learning step by step to an expert in the field (Mappalotteng, 2010). An expert is not only based on seniority but can also be with peers who have more expertise. So among fellow teachers there will also be knowledge sharing or cognitive apprenticeship during the direct learning process at school.

Efforts to improve the human resources of professional VHS teachers are also supported by Rahman's (2014) opinion that teachers in the productive field should have industrial work skills. The provision of mastery of teacher industry competencies and competency-based education for productive vocational teachers is recommended to be carried out directly in the industry, under the name of industrial apprenticeship programs for teachers alternately. Another opinion from Yamin and Maisah (2010) that professional teachers are teachers who prioritize the quality and service quality of their products. Teacher services must meet the standardization of the needs of the community, nation and its use, as well as maximize the abilities of each student.

Teacher internships can make the relevance of productive teacher competency competencies with advances in science and technology in the world of work. By being in the industry, teachers can improve their competencies, and observe directly what competencies are needed in the world of work so that they can teach them to their students appropriately. So that VHS graduates should be competent and professional people in their fields.

Teacher internships can also broaden the knowledge of productive vocational teachers towards the development of teaching factories. As happened in CV. Tirta Amara Mahesa (TAM) that the teacher internship was carried out related to the pioneering teaching factory for school drinking water production. The teacher learns the Excell drinking water production process, starting from the drinking water treatment process, drinking water production equipment, packaging production (gallons and bottles), water packaging, marketing and quality control. From the results of the apprenticeship, teachers will be able to apply drinking water treatment in schools according to industry standards and quality. This is in line with the opinion of Samnur, Fatah A, and Sunardi (2019) that teaching factory is a learning activity where students directly carry out production activities in the form of goods or services at school. The goods or services produced have quality so that they are suitable for consumption and traded to the public. Teaching factory can improve the quality of learning through a vehicle for learning by doing (learning by doing). Learning with this system will foster an entrepreneurial spirit for students.

Monitoring and Evaluation Stage

In industry, teacher internships are monitored and evaluated. At PT. Petrokimia Gresik, participants are obliged to check logs and complete attendance lists during their teacher internships, just like employees in industry. The use of work clothes and complete PPE is also monitored, as violators will face the K3 (Occupational Health and Safety) police, who will impose a fine/punishment. Meanwhile, to track participants' progress toward competency on a weekly basis, they are asked to present on their level of mastery of the content being studied.

At the conclusion of the internship, BNSP administered a competency test via LSP-P3 Indonesian Fertilizer Industry. Participants create a preliminary Process Flow Diagram (PFD) and Piping & Instrument Diagram (P&ID) for the Cooling Tower Water Treatment utility unit, which are then evaluated by assessors. If the assessor determines that the participant has mastered the content and recommends him or her as competent, the participant is entitled to two certificates, one from BNSP and one from industry. Additionally, participants submit reports on internship activities to institutions and industry.

While on CV, Tirta Amara Mahesa was not evaluated formally because the internship was implemented to develop teacher competency in drinking water treatment materials and the pioneering Tefa program in schools. When the Tefa program is implemented in schools, teacher competences will continue to be assessed through a variety of processes, problems, and barriers that need problem solving. The Tefa program

on water treatment will demonstrate teachers' ability, and sharing material with students will also be directly implemented through project learning in Tefa. At the conclusion of the internship, the teacher submits an activity report to the industry and receives a certificate. Teachers also do dissemination at schools following their internships to the principal and fellow teachers.

Supporting and Inhibiting Factors

The need for information updates, the transfer of technology from industry to schools, the willingness of industry to host internships, and a positive pattern of cooperation between schools, industry, and government through the organization of an effective and professionally managed program such as industrial class programs, VHS Centers of Excellence, reskilling and upskilling, and funding allocated for human resource development all support the teacher internship program.

The primary impediments are incompatibility between teacher competence and the apprenticeship scheme, the burden of leaving the task/KBM during the internship, and the psychological strain associated with leaving the family for an extended period of time, particularly at PT. Petrokimia Gresik for one month. While on CV. Tirta Amara Mahesa, the issue is not as serious because the internship is only for a week. Apart from time and distance, the psychological toll on the family is minimal, given they reside in the same city as the school where they attend.

Solutions to KBM difficulties can be implemented through substitute instructors or online learning; apprentices are teachers with industry-specific competencies; and expanding collaboration with industry to the point where many industries are partner schools. Another idea and input from the industry is that following the apprenticeship, the teacher is required to maintain contact with the industry in order for the school to be aware of any changes in industry conditions. This would result in the constant transmission of industry information and technological changes to schools by both professors and students.

Impact

The teacher apprenticeship program has a significant positive effect on instructors; teachers' command of competencies grows to the point where they are no longer required to translate information to students. Teachers are more confident and have more defined learning objectives as a result of their own industry expertise. With mastery of teacher competencies, teachers may more effectively share and convey knowledge in terms of science, technology advancements, skills and attitudes/industrial work culture to pupils. The instructor will be able to effectively transmit his or her industrial experiences to students, so increasing student competence and enabling pupils to internalize what the teacher conveys.

CONCLUSION

The teacher internship program in industry was implemented in two separate industries, namely PT. Petrokimia Gresik and CV. Tirta Amara Mahesa, and resulted in the following: 1) At PT. Petrokimia Gresik, the teacher apprenticeship program is implemented in accordance with the domestic teacher apprenticeship model developed by the Ministry of Industry's Education and Training Center and CV. Tirta Amara Mahesa in accordance with the apprenticeship model developed by the school (Sabon S. 2020); 2) Preparation for teacher internships is prioritized based on the similarity of competencies between teacher internships and teacher apprenticeships. Teacher internships at PT. Petrokimia Gresik are conducted through a combination of classroom instruction and field observations (plant tour) using the Process Flow Diagram (PFD) and Piping & Instrument Diagram (P&ID) methods at the Cooling Tower Water Treatment utility unit, with the expectation that participants will master the material during the allotted time. The entire financing is a collaboration between industry and the Ministry of Industry, as well as schools/participants. According to CV. Tirta Amara Mahesa, the internship will focus on pioneering teaching factories in schools. Internships in industry are necessary for teaching teachers and teaching factory implementers to operate TEFA effectively. 4) Support for the teacher apprenticeship program from the government, industry, and schools through effective program design and funding allocation; 5) The impact of teacher internships is an increase in teacher competence in terms of knowledge, skills, and attitudes, as well as the application of an industrial work culture in schools. According to CV. Tirta Amara Mahesa, the internship will focus on pioneering teaching factories in schools.

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Several things can be done to optimize the teacher apprenticeship program's implementation, including the following: 1) Developing an effective program that involves all education stakeholders, namely the government, industry, and schools, both in terms of programs and funding, while matching VHS's competencies and curriculum with industry; 2) The duration and competency structure of the internship are re-evaluated in light of the material's requirements and complexity. The more teachers who work in industry, the more their capabilities in terms of knowledge, skills, attitude, managerial and industrial work culture will be enriched; 3) Following the implementation of the teacher internship, schools and apprentice teachers are expected to increase communication and collaboration with industry in order to ensure that technical advancements in the industry are always communicated to schools and students; 4) Development of teacher apprenticeship programs or collaboration between vocational schools and industry in order to incorporate work culture or an industrial environment into schools through the teaching factory program. Business mastery occurs in industry, and by granting vocational schools the authority to manage projects with industry, schools may cultivate students' entrepreneurial spirit. Partner schools and industry can collaborate on initiatives and reap reciprocal benefits, therefore advancing VHS. Business mastery occurs in industry, and by granting vocational schools the authority to manage projects with industry, schools may cultivate students' entrepreneurial spirit. Partner schools and industry can collaborate on initiatives and reap reciprocal benefits, therefore advancing VHS. Business mastery occurs in industry, and by granting vocational schools the authority to manage projects with industry, schools may cultivate students' entrepreneurial spirit. Partner schools and industry can collaborate on initiatives and reap reciprocal benefits, therefore advancing VHS.

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