

PERSONAL COMPETENCIES OF CHEMICAL ENGINEERING STUDENT GRADUATES BEFORE ENTERING THE WORLD OF WORK

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Abstract.

To be able to survive in a world of work that changes and develops dynamically, humans are required to continue to improve their abilities periodically. Companies not only require good academic skills but also additional skills that support the company's needs. Relevant abilities (hard skills) balanced with qualified interpersonal skills (soft skills) will be very helpful in work. This ability is useful for creating career opportunities or improving career paths. So, students are required to have quality personal abilities before entering the workforce. The purpose of scientific writing is to provide a description of the self-competencies needed by a chemical engineering graduate as evaluation material for preparation for entering the real world of work. soft skills needed by a chemical engineering graduate, such as analytical skills, problem-solving skills, good communication skills, teamwork, and leadership skills. In this era of globalization, communication skills intersect with foreign language skills such as English and Japanese. Some multinational companies expect their employees to be able to speak foreign languages for the smooth operation of the company. Various efforts have been made by Chemical Engineering at Universitas Singaperbangsa Karawang in order to accommodate students and help them develop their potential. Through several activities such as chemical engineering software training, procurement of foreign language classes, and routinely holding public lectures by presenting practitioner teachers from companies. It is hoped that chemical engineering graduates from Universitas Singaperbangsa Karawang will have sufficient provisions to face the world of work.



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A. INTRODUCTION

In the era of the industrial revolution that continues to develop, companies demand human resources who not only have hard skills but also soft skills. Soft skills are an important personal trait for someone to have because they can support individual interactions, achievement at work, and career

prospects. Soft skills also support hard skills and can be used widely, not just in certain activities. Meanwhile, hard skills are skills that can be learned and measured. Obtained through formal education such as lectures and non-formal education such as courses, training, and company training. Hard skills are generally specific abilities needed for a job.

Chemical engineering graduates must have these soft skills and hard skills as capital in the world of work. Therefore, the purpose of this research is to find out what personal abilities are needed by a chemical engineering graduate that support the world of work.

Soft skills have a high role in the success of graduates, so it is hoped that universities will have programs to instill soft skills in students (Rohaeni & Wijiharta, 2022). Programs in the form of workshops, training, organizations, and student activity units are carried out to encourage students to discover their potential and improve their soft skills and hard skills. In line with its vision and mission, the Bachelor of Chemical Engineering study program at Singaperbangsa Karawang University has formulated several work programs to accommodate students in developing their potential. Starting from chemical engineering software training, assistance in improving English language communication, and holding public lectures from practitioner workers, it has been held by the Chemical Engineering Bachelor's study program at Singaperbangsa University, Karawang. These programs have a positive impact on the development of students' soft skills. As explained by (Iyan et al., 2020), this work program increases the courage to speak and improves public speaking skills.

B. RESEARCH METHOD

This research was conducted using the literature study method. This is done by collecting data from various sources, such as

national and international articles. Article collection starts with searching for articles based on the topic of discussion, grouping articles based on relevance to the topic, and organizing the discussion.

C. RESULTS AND DISCUSSION

Self skill

As mentioned by (De Campos et al., 2020), chemical engineering graduates can be responsible regarding new knowledge, express innovative ideas proactively, and think critically and independently. He also said that engineering graduates not only have technical knowledge but are also able to bridge this technical knowledge with other employees and social life. The main skills of a professional at work include verbal and written communication, being able to work together in a team (teamwork), having initiative in solving problems, following technological developments, and being able to manage time well (San-Valero et al., 2018). According to (Pratama et al., 2019) communication skills, leadership skills, and analytical skills are the three soft skills most often needed by companies.

Analytical ability

Analytical ability is the ability to identify a problem, collect and analyze information, and also make decisions. The ability to think analytically can be used when analyzing data, finding out the latest information, and making decisions based on a series of factors that are taken into consideration (Syafi'i et al., 2018). In the

world of work, employees are required to give their best performance in completing all work. However, there will be various obstacles or problems that arise in the process. This analytical ability is important for a graduate to have to know what solutions are the most effective and appropriate when encountering various kinds of problems. So you can immediately make a decision regarding what steps should be taken to resolve the problem.

Problem solving

The next knowledge and ability is problem solving. Is the ability to find the best solution to a problem by identifying the cause. Can identify why a problem is not working as expected, find out the cause of the problem, and then determine the solution or action taken to fix it. Problem solving is part of the thinking process (Rosidi & Hidayati, 2016). Problem solving, or what is also called problem solving, in a course is the development of students' soft skills so they can solve a problem. Not only in the classroom, but they can also develop soft skills after graduating from college. In today's world of work, superior human resources not only have physical abilities or good value but also have abilities in the soft skills aspect.

Communication

Communication is a very important soft skill for an engineer; engineering graduates are required to learn and re-improve their generic skills in order to remain significant in the work environment (Kamaruzaman et al., 2020). Communication skills in various forms, such as written, verbal, graphic, and so

on, are skills needed to improve professional skills. In honing written and graphic communication skills, this can be done using an analysis quiz before and after carrying out a practicum or training, so that students and presenters are able to see the results and improvement of written and graphic communication skills based on a comparison of the results of the two analysis quizzes that have been carried out (San-Valero et al., 2018). Graphic communication in industry is generally described as requiring computational skills to analyze and process data (Beck et al., 2016).

Teamwork

Teamwork, or working as a team, is a soft skill that a chemical engineering graduate must also have. This is because chemical engineering graduates will later work with people from different multidisciplinary scientific fields (Tsalaporta, 2021). Working together and contributing to completing work to achieve common goals (Fletcher et al., 2016). If someone is used to working in a team, it will usually be easy for them to build relationships with new people in the work environment. Because in teamwork, people must be able to take responsibility for their respective jobs and roles, understand and respect each other, and accept each other's ideas and opinions.

Foreign language skills

Foreign language skills are very necessary to support good communication. According to (Iriance, 2018) concluded that in 2018 Indonesia was a country with a very low

proficiency category in English language skills in 2018. Even though in certain cases English is considered a gateway to employment, it requires awareness, motivation, will, and perseverance, where working to improve English language skills is a lifelong learning process (Aydin & Yildirim, 2019; Phiphatchirakul & Tepsuriwong, 2018).

As for job vacancies, companies will usually provide the qualifications required for the open position, one of which is foreign language skills. English language skills are the official international language of instruction in 42 countries and are the main language in global business and the workforce in the ASEAN region, which competes in eight professional fields, namely engineering, nursing, architects, surveying, doctors, dentists, tourism, and accounting. English is used to communicate, debate, and discuss ideas in meetings (Iriance, 2018; Zainuddin et al., 2019). Fluent English language skills are seen based on TOEFL scores of 550 and IELTS at level 6, which are obtained by taking reading, listening, writing, and grammar tests through an institution.

Foreign language skills, especially English, are important for chemical engineering graduates. This is because some terms for chemical processes cannot be interpreted in other languages, such as mass and energy balances, backwash, slurry, and several other examples (Wijaya, 2019). In the case study, a laboratory engineer in a Japanese company did not have English or Japanese

language skills, while at the location he had to coordinate with foreign colleagues. So it has a negative impact on oneself and hampers communication between teams because other coworkers are not able to speak English well. It becomes easy for them to blame them for mistakes they didn't make just because they can't speak English (Phiphatchirakul & Tepsuriwong, 2018).

Apart from English, Japanese language skills are also equally important. Japan is one of the ASEAN countries that has a big influence on the Indonesian economy. As a business partner, Japan ensures its existence through Japanese multinational companies that contribute positively to Indonesia-Japan trade (Putri, 2020). Apart from implementing Japanese culture, several Japanese multinational companies also practice using Japanese with their employees (Fiana et al., 2018). Japanese language skills are generally based on the minimum standard JLPT N3 (Japanese Language Proficiency Test), where a person is considered able to listen, write kanji, and understand everyday conversations. The ability to read Japanese in some Japanese companies is generally only possessed by executives and professionals, but it does not rule out the possibility that managers and general workers can also read and speak Japanese (Wahidati & Djafri, 2021; Yeoh & Singh, 2020).

Implementations in chemical engineering, Universitas Singaperbangsa Karawang (UNSIKA)

The Chemical Engineering study program at Universitas Singaperbangsa Karawang, has played an active role in facilitating students to hone their potential. A number of activities are carried out to support students in developing soft skills by conducting several trainings related to the skills needed for a chemical engineering graduate. According to (Teles Dos Santos et al., 2018), chemical engineering knowledge acquired by students and programming skills can be integrated to develop computational tools, supporting chemical engineers to take advantage of new opportunities in the digital field. According to this statement, Chemical Engineering at UNSIKA has held software training related to chemical engineering, such as Aspen Hysys and AutoCad P&ID. This training activity is carried out to develop and train students' skills in the field of technology.

Aspen Hysys software can provide benefits for chemical engineering graduates in creating available industry-standard flowsheet simulations and minimizing design time (Santos & Van Gerven, 2020). Aspen Hysys is a powerful process simulator with a large library of ready-to-use component models and built-in property packages. It enables static and dynamic modeling of a wide variety of complex chemical and hydrocarbon fluid-based processes simply by connecting various modules using material and energy flows. This allows the simulation of various energy

systems or options other than power generation (Liu & Karimi, 2018). Through this Aspen Hysys software training activity, students gain deeper knowledge regarding unit operations, process flow diagrams, and other disciplines related to their final chemical engineering assignment, namely chemical plant pre-design (Sutardi et al., 2020). At the last meeting, students were given a case study to complete as a group. This case study is a process and solution problem using Aspen Hysys simulation. Because of this, this activity helps hone students' abilities in the areas of analytical skills and teamwork.

The second training activity is AutoCad P&ID software training. This training was chosen because many industries use AutoCad P&ID for process planning and maintenance (Boccaccio et al., 2019). This software has various features, namely two-dimensional and three-dimensional visualization images as well as reading dimensions such as length, area, and volume of objects (Titin & Safitri, 2021). AutoCad P&ID software can be used in the ISO 15926 standard with the DEXPI specification extension and XML file format (Papakonstantinou et al., 2019). Therefore, Chemical Engineering at UNSIKA held this training so that it could increase the skills needed for a chemical engineering engineer.

Apart from that, chemical engineering at UNSIKA has provided chemical engineering and English-speaking classes to support students' foreign language skills. This was chosen based on almost all chemical engineering material using English language

books (Iyan et al., 2020). By holding this activity, it is hoped that English language skills will increase, making it easier for students to understand the material. This activity provides many benefits for students in terms of self-development. One of them is public speaking or communication skills. In one of the meetings, students were asked to present themselves in English in front of the class. This can hone students' ability to speak in public. Apart from that, the results of this activity are increased motivation and self-confidence, as well as increased enthusiasm for attending lectures (Iyan et al., 2020).

Another effort is holding public lectures by bringing in practitioner teachers from companies to increase students' insight and skills. This public lecture was held to broaden insight and provide an overview of the application of theories taught by academic teachers with field experience from practitioner teachers (Ulfa et al., 2020). The material provided is a continuation of several courses such as chemical industrial tools, chemical industrial processes, utilities, and waste processing technology. From this activity, students learn the differences between theories obtained in class and their application to the world of work.

During the COVID-19 pandemic, all face-to-face activities and engagements were limited to avoid the spread of the SARS-CoV-2 virus. This has an impact on campus activities, which have to carry out all teaching and learning activities at home. However, this does not prevent the Chemical Engineering

Study Program at Singaperbangsa University Karawang from holding activities that support students in developing their own skills. These activities are still held, even though they have to be done online. The meeting was held via video conference media, namely Zoom Meeting. Through this medium, all Chemical Engineering students at UNSIKA Through this activity, students can still develop their personal skills and maintain their productivity at home. Although all activities on campus have been temporarily stopped,

D. CONCLUSION

To be a chemical engineer, you not only have to be an expert in the scientific field you are studying, but you also need to have the skills needed in today's industry. Some of the skills needed by chemical engineering graduates include analytical skills to solve problems that occur when working in an industry, problem-solving skills as a preparation for entering the industrial world, critical thinking so that you can create innovation or creative ideas, and having experience. internship in an industry to increase knowledge and understanding of the world of work. Apart from that, a chemical engineering graduate is expected to be able to speak a foreign language so that it is easy to communicate when working for a multinational company. To produce graduates who have these skills, Chemical Engineering at Universitas Singaperbangsa Karawang holds grammar and English-speaking classes. Another effort made is by holding software

training related to chemical engineering, such as Aspen Hysys and AutoCad P&ID, so that chemical engineering graduates at Singaperbangsa University Karawang are able to master these two softwares and apply them when working in an industry.

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