

Defining Vocational Teacher Competencies in Industry 4.0 from the Perspective of Teachers and Lecturers

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Abstract: The purpose of this study was to analyze the competence of vocational teachers needed in implementing the independent learning policy based on the opinions of teachers and lecturers. The research method uses quantitative methods on 356 teachers and lecturers. The results showed the priority of vocational teacher competency indicators from pedagogical competence, social competence, personality competence, and professional competence. The pedagogic competency indicator that is needed by vocational teachers is the ability to motivate students. An indicator of social competence that is needed by vocational teachers is having a polite and polite attitude. Personality competency indicators that are needed by vocational teachers are having an honest personality, and indicators of professional competence that are needed by vocational teachers are the ability to transfer knowledge and technology.

Keywords: competence, competence of teachers, vocational teachers, independent learning, teachers, lecturers

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1. Introduction

Teacher competence is a basic ability that must be possessed by a teacher to carry out duties as a teacher and educator. Competence is defined as the ability to carry out tasks obtained through education. The expert opinion states that "A competency is an underlying characteristic of an individual that is causally related to criterion-referenced effective and/or superior performance in a job or situation" (Rosina et al., 2021). This means that competence is a basic characteristic of a person who is interconnected and has a cause and effect. Thus, competence will refer to effectiveness and or high performance in certain jobs or situations. Indeed, strategies to improve competency must be done (Fadillah et al., 2022).

Changes in learning following the industrial era 4.0 have an impact on the role of vocational education. Specifically, it must be focused on the role of educators (Omolafe, 2021). The policy of independent learning is a response to the needs of the education system in the industrial era 4.0. In this era, the education system is expected to create students who have critical thinking, problem-solving, creative, innovative, communicative, and collaborative thinking skills. In addition, in this era, the perspective of the learning method to be achieved has shifted, namely, students can master new literacy, namely data literacy, technology, and human literacy (Yamin and Syahrir, 2020). If there is no change in roles, where educators still maintain their role as transmitters

of knowledge, then they will lose their role along with the development of technology and changes in learning methods. This condition must be overcome by increasing the competence of educators who support knowledge for exploration and creation through independent learning. Competencies found through search and research on seven domains in vocational teacher teaching competencies, namely teaching design, teaching and learning guidance, research on teaching content, research on teaching methods, career and interpersonal relationship guidance, management support for school and class, cooperation.

The 21st century is a century of openness and globalization. Thus, the learning content is expected to be able to meet 21st-century skills, including (i) learning and innovation skills including mastery of diverse knowledge and skills, learning and innovation, critical thinking and problem solving, communication and collaboration, and creativity and innovation, (ii) skills digital literacy includes information literacy, media literacy, and ICT literacy, (iii) career and life skills include flexibility and adaptability, initiative, social and cultural interactions, productivity and accountability, and leadership and responsibility (Rachmawati, 2019; Firdaus et al., 2017; Hashim et al., 2020). The five competencies that teachers must prepare to face the industrial era 4.0 are educational competence, competence for technological commercialization, competence in globalization, competence in future strategies, and counselor competence. Another opinion states that the four competencies that teachers must have in the industrial era 4.0 are that teachers must be able to carry out comprehensive assessments, teachers must have 21st-century competencies including character, morals, and literacy, teachers must be able to present modules according to the passions of students, and teachers must be able to do innovative authentic learning (Lase, 2019).

Apart from the role of educators, in achieving 21st-century skills, learning trends and best practices must also be adjusted, one of which is through integrated learning or blended learning. Vocational education must prepare the career development of students, prioritize graduate competencies, establish access to global education, and improve personal development, especially regarding social skills. A vocational teacher is required to have good competence in the field of teaching expertise. Competencies that are required in the law include pedagogical competence related to the way or ability of teachers to teach students, social competence related to fostering relationships between teachers and students and parents/guardians of students and society, personal competence related to personal demands that must be owned by a teacher, and professional competence is related to the teacher's mastery of the material being taught.

The pillar of teacher creativity is the ability to complete learning well which is shown by an increase in learning outcomes. This means that the teacher uses and utilizes existing resources in learning activities to improve abilities either by changing the environment, using media / assistive devices, or can also hold activities outside the classroom.

Creativity does not have to be expensive, in fact, the simpler and easier it is to understand learning, the better. The competence of educators in the vocational field must quickly learn in terms of increasing cooperation with industry and recognizing what new competencies are needed by the industry through the use of various data. In addition, educators must develop their skills including how to manage student data, career guidance through the use of big data, thus educators and students can immediately adapt to changes in industry 4.0. This study aims to analyze the competence of vocational teachers needed as a response to the independent learning policy in facing Industry 4.0 based on the opinions of teachers and lecturers.

2. Method

A total of 356 people who work as teachers and lecturers were involved as research respondents. Data collection was carried out by survey technique using a questionnaire instrument. Relevant previous research literature studies produce competency indicators of vocational teachers. This indicator becomes the core of the research where the level of need is asked of the respondent, namely very needed, needed, sufficiently needed, not needed, and not needed. Table 1 provides indicators of each competency.

3. Results and Discussion

3.1. Pedagogic Competency Analysis

According to the opinion of teachers and lecturers, the pedagogical competence of vocational teachers is presented in Fig. 1. Vocational teacher pedagogic competency indicators that must be possessed to face the demands of independent learning include motivating students, identifying student competencies, collecting student background data, analyzing various backgrounds of students, preparing learning administration (syllabus, lesson plans, and teaching materials), become a director, take the initiative, educational assessments, evaluate learning processes and outcomes, the ability to take reflective action on the quality of learning, willingness to change teaching strategies and methods, creativity in designing assessment strategies and use various information and technology facilities as supporting teaching materials (Rosina et al., 2021). And, this must be supported by good curriculum (Maryanti et al., 2021; Maryanti & Nandiyanto, 2021; Maryanti & Nandiyanto, 2023).

Based on the results of the study, the pedagogical competence that is needed by vocational teachers according to respondents is the ability to motivate students. As many as 85% of respondents stated that vocational teachers must be able to motivate students. Motivation is one of the factors that can improve the quality of learning because students will learn seriously if they have high motivation (Thoonen et al., 2011). Therefore, to improve the quality of learning, teachers must be able to arouse students' learning motivation thus they can achieve learning objectives (Bidabadi et al., 2016). 85% of respondents stated that vocational teachers should be able to evaluate learning processes and outcomes. Every teacher is required to master the principles and techniques of

evaluation to measure the achievement of learning objectives thus the results can be scientifically accounted for (Brown, 2001).

75% of respondents stated that a vocational teacher should be able to be a guide. The teacher acts as a guide in

teaching and learning activities must be able to help students to achieve goals.

Table 1. Vocational Teacher Competency Indicators

No.	Teacher Competence	Competency Indicators
1	Pedagogic competence	a. Motivate students b. Identify the competence of students c. Collect student background data d. Analyze the various backgrounds of students e. Prepare learning administration (syllabus, lesson plan (RPP), and teaching materials) f. Become a director g. Initiative h. Educational Appraiser i. Evaluating the process and learning outcomes j. The ability for reflective action on the quality of learning k. Willingness to change teaching strategies and methods l. Creative in designing assessment strategies m. Using various information and technology (IT) facilities
2	Social competence	a. Communicate verbally effectively and well b. Communicate in writing effectively and well c. Have good adaptability d. Have a disciplined attitude e. Have a polite and polite attitude f. Have a good sense of empathy
3	Personality competence	a. Have an honest personality b. Interact socially well c. Manage time effectively d. Collaborate and collaborate e. Have self-confidence f. Have a leadership spirit
4	Professional competence	a. Have expertise in their field b. Able to transfer science and technology c. Have good technological literacy d. Able to develop teaching materials according to needs, situations, and conditions e. Able to develop the profession that is owned in a sustainable manner f. Have a field of expertise certification g. Have a teaching certification

73% of respondents stated that vocational teachers should be able to prepare learning administration including syllabus, lesson plans, and teaching materials. As professionals, teachers are tasked with planning learning, implementing learning, assessing learning outcomes, conducting guidance and training, conducting research, assisting in the development and management of school programs, and developing their professionalism (Ministry of National Education, 2014). 72% of respondents stated that vocational teachers must be able to identify students' competencies and have creativity in designing assessment strategies. The application of the assessment must measure what will be measured appropriately, both the skills and knowledge of students. The assessment that is carried out must be meaningful, relevant, and support the long-term success of students.

71% of respondents stated that vocational teachers must have the willingness to change teaching strategies and methods. The learning strategy is a method that will be used by the teacher to select learning activities that will be used

in the learning process. The use of innovative learning strategies in learning activities is needed because it can simplify the learning process (Kalyani and Rajasekaran, 2018). 68% of respondents stated that vocational teachers should be able to assess education. The teacher as an evaluator (evaluator) must collect, analyze, interpret, and give consideration (judgment) to the success rate of the learning process based on established criteria, both regarding aspects of the effectiveness of the process and the qualifications of the product. 60% of respondents stated that vocational teachers should be able to take the initiative. The teacher's role related to learning activities must be accompanied by high initiative, this condition is needed if a problem occurs in the learning process as a form of problem-solving.

49% of respondents said vocational teachers should be able to collect student background data. A teacher must have the ability to see the characteristics of students from various aspects, both moral, emotional, and intellectual. 45% of respondents said vocational teachers should be able to

collect student background data. This is in line with the statement that a teacher must be able to analyze the background of students. Pedagogic competence is a skill or ability that must be mastered by a teacher to see the characteristics of students. The implication of this ability can

certainly be seen in the teacher's ability to master the principles of learning, from learning theory to mastery of teaching materials. It is written in Indonesian law number 14 of 2005.

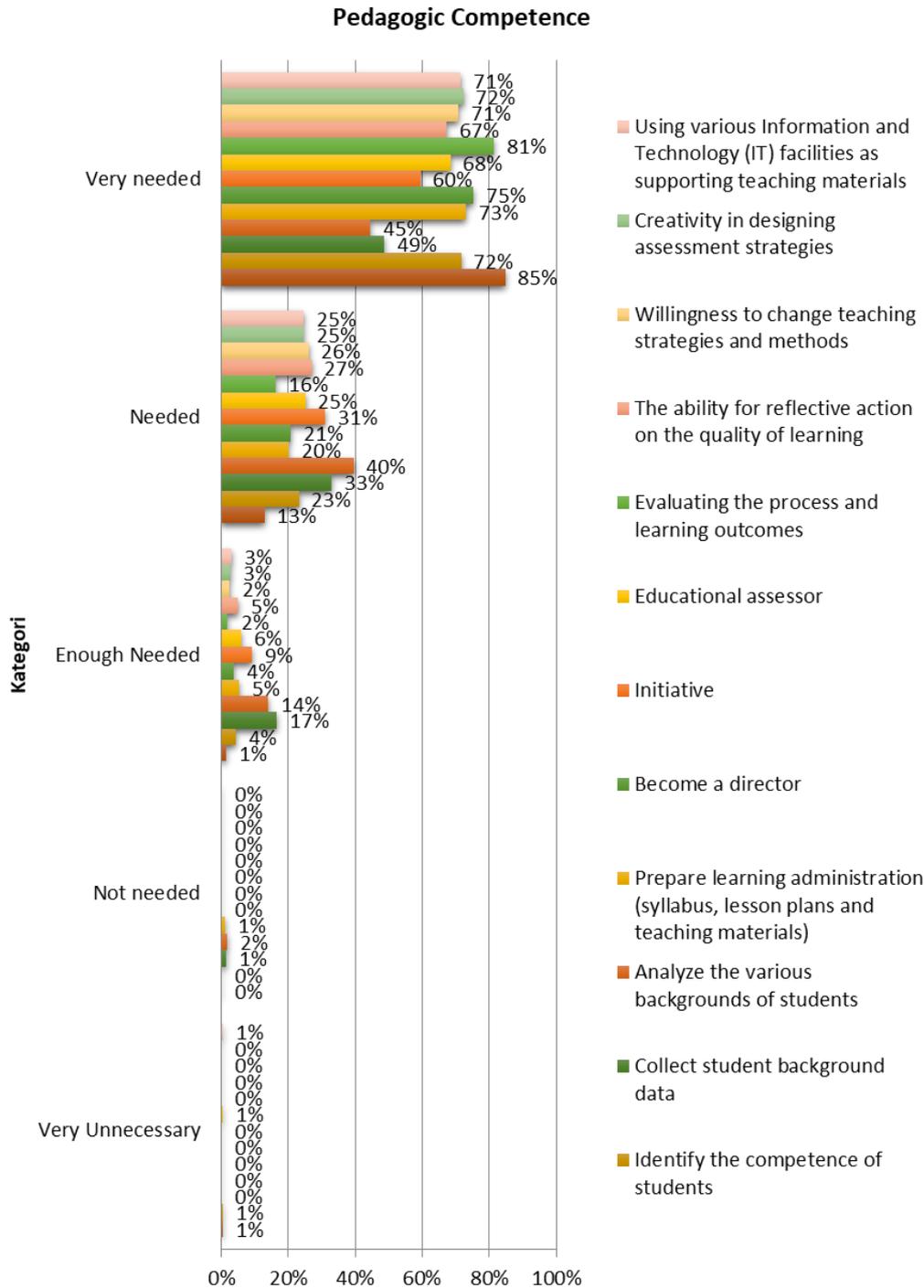


Fig. 1 Vocational teacher pedagogical competencies based on teacher and lecturer opinions

3.2. Qualitative Analysis of Student

The six indicators of social competence that a professional teacher must have been having a sense of empathy, having a polite attitude, having a disciplined attitude, having good

adaptability, having effective and good oral and written communication skills. The social competence of vocational teachers based on the opinions of teachers and lecturers can be seen in Fig. 2.

The results of the analysis of the social competence of vocational teachers based on the opinions of teachers and lecturers, obtained priority indicators needed by vocational teachers to face the demands of independent learning. Indicators have a polite and polite attitude, 89% stated that polite and polite attitudes are needed by vocational teachers, 10% also said they were needed, and 1% stated that it was sufficiently needed. This means that there are no teachers or lecturers who state that polite and polite attitudes are insufficient or not needed for vocational teachers. Indicators have a disciplined attitude, 83% stated that a disciplined attitude is needed for vocational teachers, 16% is needed and 1% of teachers and lecturers say that discipline is quite necessary. On the indicator of having a sense of empathy, 82% stated that a sense of empathy was needed for vocational teachers, 17% was needed, and 1% stated that it was quite necessary.

Indicators of oral communication skills, most of the teachers and lecturers (79%) stated that verbal communication is needed for vocational teachers. 20% said it was needed, and only 1% said it was sufficient. There are no teachers and lecturers who stated that oral communication was insufficient or unnecessary. Indicators of good adaptability, as many as 76% of teachers and lecturers state that adaptability is very much needed for vocational teachers, 22% is needed, and 2% is quite needed. Indicators of written communication skills, as many as 73% of teachers and lecturers stated that written communication was needed for vocational teachers, 25% was needed, and 2% stated that it was sufficiently needed.

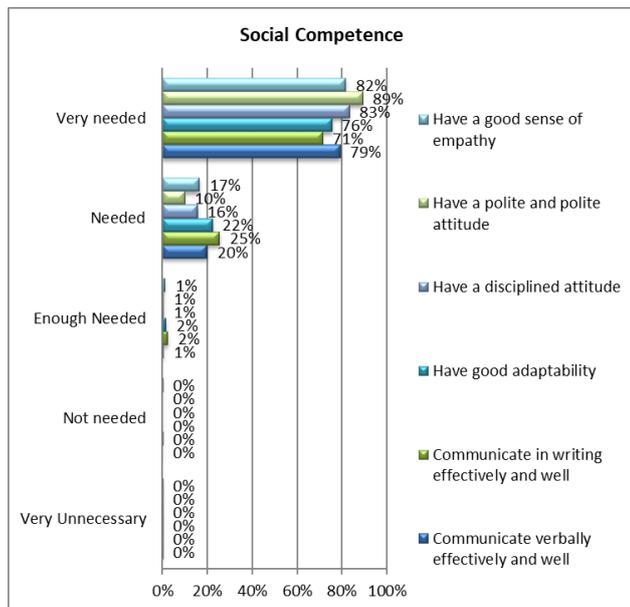


Fig. 2 Vocational teacher social competence based on teacher and lecturer opinions

All teachers and lecturers perceive that social competence consists of indicators; a sense of empathy, polite attitude and attitude, discipline, adaptability, the ability to communicate orally and in writing are all necessary for vocational teachers. More than 80% stated that social competence was needed, and less than 20% stated that it was needed / sufficiently needed.

3.3. Personality Competency analysis

The personality competencies of vocational teachers based on the opinions of teachers and lecturers are shown in Fig. 3. A vocational teacher must also have competencies related to his personality. The researcher asked the respondent for their opinion on how much personal competence the vocational teacher should have. Six indicators of personality competence needed by vocational teachers to face the demands of independent learning are having an honest personality, being able to interact socially well, managing time effectively, collaborating and collaborating, having self-confidence, and having a leadership spirit.

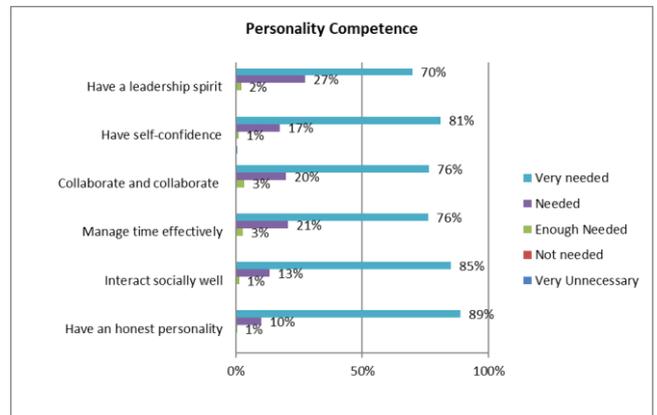


Fig. 3 Vocational teacher personal competencies based on teacher and lecturer opinions

The results showed that 92% stated that vocational teachers must have the ability to develop themselves sustainably. A teacher must develop abilities as a support for the implementation of learning, the ability to develop oneself according to needs which are carried out in stages, continuously to increase their professionalism (Hammond et al., 2019). 77% stated that vocational teachers should be able to evaluate their performance. The importance of the ability to conduct performance evaluations is related to the consideration that the mastery of competencies and the application of teacher knowledge and skills greatly determines the achievement of the quality of the learning process or the guidance of students. 92% think teachers must have authoritative behavior that can have a positive influence on their students. The ability of a teacher to display a good personality in front of his students can have a good

influence on the surrounding environment, especially students.

92% stated that vocational teachers must have a high work ethic. The work ethic of the teacher can be used as the main idea in the world of education, where the work ethic of the teacher in a school organization is necessary to improve the efficiency and effectiveness of the process of implementing learning tasks in the school education unit. 77% think vocational teachers must have independence in action, have a strong motivation drive at work, including mastery of the principles of vocational education professionalism in improving their teaching competence. Consistent in acting following norms, teachers must be careful in acting and behaving. All attitudes, actions, and behavior of teachers must always pay attention to the religious, legal, and social norms that apply in a diverse society and culture. 77% think vocational teachers must have a sense of pride in being a teacher. A sense of pride as a teacher will provide a strong spirit for teachers to enjoy and carry out their profession well (Schweisfurth, 2005). Pride as a teacher is a big asset that every teacher must always maintain because this sense of pride will provide a strong sense of confidence in running.

3.4. Professional Competency Analysis

Indicators as a derivative of professional competence needed by vocational teachers consist of having expertise in their field, being able to transfer science and technology, having good technological literacy, being able to develop teaching materials according to needs, situations, and conditions, being able to develop their professions sustainably, has a certificate of expertise, and has a teaching certification. The results of the professional competency analysis of vocational teachers based on the opinions of teachers and lecturers can be seen in Fig. 4.

Vocational teacher expertise in the field is indispensable to ensure the implementation of vocational teaching and learning. This is evident from the perceptions of teachers and lecturers who show a high percentage of this indicator, which is 85%, which is very much needed. In addition, vocational teachers can bring several knowledge bases into the practice of their students to develop other knowledge bases in completing competency testing programs, for example (Robertson, 2018). Teacher expertise can also build vocational identity in students thus there is confidence in them to master a certain vocational skill (Nze and Ginestié, 2012; Köpsén, S.2014).

The ability of vocational teachers to transfer science and technology is non-negotiable. 78% stated that this indicator is needed by vocational teachers. Especially in the era of technology and disruption, mastery of transferring science and technology to students can support the success of the learning process. Vocational learning is identical to the use of the technology it has learned. Therefore, it is necessary to develop digital skills for vocational teachers. The current technological literacy ability of teachers is one part of teacher competence in the industrial era 4.0. Without technological literacy, teachers will find it difficult to

transfer technology to students, including the ability to understand online learning practices (Baran et al., 2011). The efforts of vocational teachers to improve their professionalism are to develop their professionalism sustainably. This is the development of a current vocational identity that includes all knowledge and skills possessed by teachers. For example, vocational teachers can understand and be actively involved in lesson study learning activities or CBT-based teacher training programs (Atkins and Tummons, 2017).

Expertise certification for vocational teachers is necessary. The knowledge, expertise, skills, competence, and professionalism of vocational teachers are very important (Mohamad & Masek, 2021), especially in contributing to the birth of quality Vocational High School graduates. The strategies offered for vocational teachers in carrying out their professionalism can adapt the 4-on pattern in the tasks they carry, namely vision, action, passion, and collaboration (Yusuf & Mukhadis, 2018). Vocational teachers are required to always be dynamic following developments in science, technology, and information. As educators, vocational teachers should practice the principle of lifelong learning, and be able to build and develop themselves thus they can maintain their competence and professionalism. In the current era of certification, all teachers are expected to have teaching competency certification. An educator certificate is formal proof of someone who is considered to have teaching skills. The consequence is that there is an obligation to teach a certain number of hours. But on the other hand, 4 respondents stated that vocational teachers do not need to have teaching certification. This may be because the ability to teach can be considered an art. In addition, it may be a form of a disappointment for teachers who face obstacles when arranging teacher certification such as bureaucracy, administration, and others. Consequently, there is an obligation to teach for a certain number of hours.

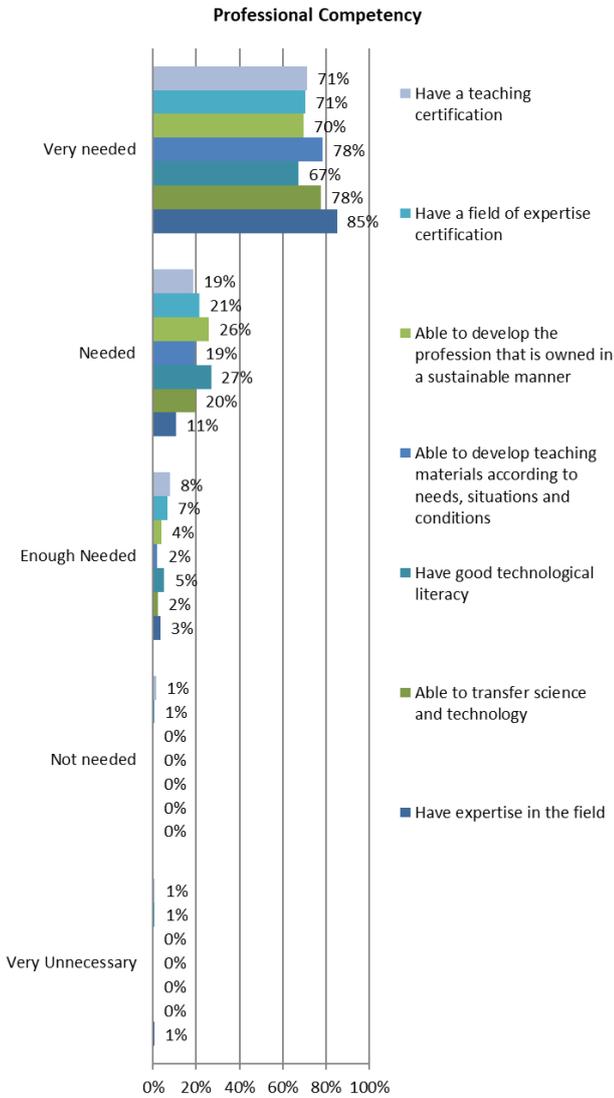


Fig. 4 Vocational teacher professional competence based on the opinions of teachers and lecturers

4. Conclusion

The priority indicators of social competence needed by vocational teachers are to have a polite and polite attitude, have a disciplined attitude, have a good sense of empathy, the ability to communicate effectively orally, have good adaptability, and the ability to communicate in writing effectively. The priority order of personality competency indicators needed by vocational teachers is to have an honest personality, interact socially well, have self-confidence, manage time effectively, collaborate, and have a leadership spirit. The priority indicators of professional competence needed by vocational teachers are having expertise in their fields, being able to transfer science and technology, being able to develop teaching materials according to needs, situations, and conditions, having certification in areas of expertise,

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