

## Self-directed learning readiness of automotive body repair student to face 4.0 learning system

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### ARTICLE INFO

#### Article History

Received:

3 October 2019;

Revised:

19 November 2019;

Accepted:

18 February 2022;

Available online:

11 July 2022

#### Keywords

4.0 Learning System;

Automotive;

Body repair;

Vocational

### ABSTRACT

This study aims to reveal: 1.) Readiness of independent learning of vocational students in the department of automotive body repair to face 4.0 learning systems; and 2.) Supporting and inhibiting factors of students in implementing a 4.0 learning system. This study uses a descriptive-analytical method with a case study approach. The subject consisted of students and teachers of vocational high school majoring in automotive body repair. Data collection techniques in this study were observation, interviews, and questionnaires. The research was conducted at SMK N 2 Depok Sleman, automotive body repair engineering department. 30 respondents filled out the questionnaire to assess the level of self-directed learning readiness of respondents according to SDLR. The readiness level of self-directed learning is divided into three categories: low, medium, and high. The results of this study are (1) Readiness of students majoring in automotive body repair techniques in the face of learning systems 4.0 is included in the medium category, and (2) The supporting and inhibiting factors found in dealing with learning systems 4.0 come from internal and external of the student learning environment.



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### How to cite:

Pratama, A. P., Sofyan, H., & Yudianto, A. (2022). Self-directed learning readiness of automotive body repair student to face 4.0 learning system. *Jurnal Pendidikan Vokasi*, 12(1), 43-52.

<https://doi.org/10.21831/jpv.v12i1.27447>

### INTRODUCTION

Industry 4.0 is a revolution in the form of technology that cannot be used for various kinds of human activities based on what they do every day into technology-based. According to *Speech by Federal Chancellor Angela Merkel at the VIIIth Petersberg Climate Dialogue (2017)*, all aspects of the industrial era 4.0 are currently inseparable from unlimited use of power and data usage in the service and utilization of the internet. Industry 4.0 is defined as a comprehensive transformation in the technology of combining digital and internet technology with the conventional industry. Industrial era 4.0 also requires students' skills in using technology to communicate at the national level and internationally so that students can compete globally with the knowledge and competencies they have (Purwasih & Rahimmulaily, 2019).

Lee et al. (2013) summarise this by saying industry 4.0 is driven by several factors, namely: 1.) Increased data volume, computing power, and connectivity; 2.) Emergence of analysis, capability, and business intelligence; 3.) The formation of interactions between humans and machines; and 4.) Improvement of digital transfers into the physical world such as robots or 3D printing. The impact

of the 4.0 industrial revolution does not only change industrial and economic aspects, social processes, and aspects of learning or education.

Education is a very important aspect and has become the main need of every human being. Education creates changes in a person's attitude and ethics. Through education, a person is expected to be able to increase his competence in various fields so that he can compete with others in the face of learning 4.0 (Pusriawan & Soenarto, 2019). In the face of learning 4.0 in the 21st century, Vocational students must have four competencies which are including (1) critical thinking; (2) creative and innovation; (3) collaborative; and (4) communicative (Muslim et al., 2019). Based on this, it can be concluded that education is a very important factor in determining a person's attitudes, ethics, and competence to achieve the learning system 4.0.

Learning in the era industry 4.0 ideally fits the stages of student intelligence development. This is important because the suitability of the learning process with students will lead to an interest in learning. Classroom learning in the industry 4.0 era needs to be optimized through learning activities to develop students' abilities to learn well. The learning process using appropriate methods and media will facilitate the development of student's abilities at the optimal development stage. Learning is a process that occurs through interaction between students and teachers, as well as students and other students.

Therefore, it is important for students to get the learning process using learning models appropriate to the development stage of their intelligence. Therefore, the process of developing student competencies must begin with learning that can facilitate students through learning activities carried out by students. The importance of information regarding student characteristics relates to how to develop learning resources or media and the appropriate learning process. Learning in students must be facilitated using learning processes and resources that fit the characteristics of students (Januszewski & Molenda, 2013). Learning technology plays a role in selecting appropriate learning methods and resources for conveying the learning message.

In the educational aspect of industrial development, 4.0 is often referred to as a 4.0 learning system. The 4.0 learning system is a learning system that utilizes the internet as access to developing science and technology. This learning system is often referred to as Heutagogy Education. The pedagogy approach is seen as a platform to develop an understanding that students are empowered to see what is learned, learn new contexts, and make decisions in that context (Narayan et al., 2019). Heutagogy approach (self-determined learning) has the principle that more mature students need less control from the instructor and, of course, the structure and can be more independent in their learning, while under-developed students need more instructor guidance and prerequisite courses (Canning & Callan, 2010). According to Hiryanto (2017), heutagogy is often defined as a self-determined learning study.

The role of educators in the 4.0 learning system is as a leader of a team that collaborates with students to create science and technology by utilizing the internet and other supporting devices to improve students' ICT skills (Wardani, 2018). ICT Skill needs to be developed, this is in accordance with the opinion of (Majid & Ridwan, 2019), which states that information and communication technology (ICT) nowadays has developed so rapidly that all fields use ICT to increase their activities. Teachers and students must always associate the use of ICT tools with subjects in the area of expertise, expertise programs, and skills competencies learned in schools so that they can improve their ICT Skills (Agustini et al., 2019). Based on this explanation, it is necessary to collaborate between teachers as leaders and students as teams in utilizing ICT devices in the learning process. The use of ICT will later be integrated with the competencies and expertise programs learned by students, so hopefully, ICT skills can be increased together with the competency skills learned.

The learning process on the 4.0 learning system is carried out openly so that it is expected to increase the learners' creativity. Besides that, the learning process is done by creating social networks between classes and disciplines. 4.0 The learning system requires students to be active and have an attitude of independence in learning. Students are expected to be able to choose the learning materials used to improve their competence. Materials that are a source of independent learning in the 4.0 learning system should be easily accessible to students anywhere and anytime.

The 4.0 learning system in Indonesia has not been fully implemented either in upper secondary or vocational high schools. However, several universities in Indonesia have begun to implement a 4.0 learning system. This, in addition, is because the uneven internet network found in the regions is also due to supporting facilities and infrastructure, as well as the ability of each individual involved in learning and literacy skills both from students and educators. This literacy focuses on three things: (1) digital literacy, (2) technology literacy, and (3) human literacy. Digital literacy aims to improve the ability to read, analyze and utilize information in the digital world. Technology literacy aims to improve understanding of machine work events and technology applications. While human literacy aims to improve communication skills and mastery of design knowledge (Aoun, 2017).

About the industrial revolution 4.0, vocational schools have a huge opportunity to implement a 4.0 learning system. Vocational education is education that directs students to continually improve individual independence in improving their competencies in order to compete and the ability to entrepreneur by their competencies. This is in line with the principles of the 4.0 learning system that demands students' independence in learning.

According to Bukit (2014), vocational education has the characteristics, namely: 1.) Oriented to the performance of each individual in the world of work; 2.) Specific justification of needs in the field; 3.) Focusing on the curriculum with psychomotor, affective and cognitive aspects, 4.) Measures of individual success not only limited to school; 5.) Having sensitivity to the development of the world of work; 6.) Requires adequate facilities and infrastructure; and 7.) The existence of support from the community. Also, vocational education aims to develop knowledge, abilities, and skills to shape one's competence (Prosser & Allen, 1925).

Based on this, vocational education has great potential to implement a 4.0 learning system to produce competent individuals in their field ready to plunge into industry 4.0. One of them is a vocational school majoring in automotive body repair techniques. However, before this 4.0 learning system is implemented, it is necessary to analyze the readiness of students' independent learning and analyze the supporting and inhibiting factors that influence the application of the 4.0 learning system in vocational schools, especially in automotive body repair techniques.

The readiness for independent learning is often referred to as Self Directed Learning (SDL). According to Stockdale and Brockett (2010). SDL is a process of an individual taking the initiative with or without help from others and carried out by being aware of his own needs in learning, managing personal goals, making learning decisions and strategies, and assessing results. Besides, (Darmayanti, 1995) describes SDL as an ability to regulate, manage and control students' learning process in overcoming various kinds of problems in learning by using various kinds of alternatives or learning strategies.

According to Aruan (2015), self directed learning is defined as a person's ability to take the initiative in managing, managing, and controlling the learning process in overcoming various learning problems by evaluating and determining how to learn according to needs. SDL is also defined as an increase in knowledge, expertise, and self-development achievements where loyal individuals use various methods in many situations at all times (Darmayanti, 1995). This concept is very relevant to the theme of the 4.0 learning system, where an individual must continue to improve the competencies possessed through teaching materials that can be easily obtained so that they have the ability in terms of connectivity with others, discovery, and sharing of information and personal collecting and adaptation of information (Wardani, 2018).

These various things become urgent that it is important to examine the readiness of the education component in dealing with industry 4.0. After knowing the readiness for the implementation of learning, all aspects of support and obstacles can be anticipated for the advancement of education in a school or learning institution. This research will describe the readiness of learning in the industrial era 4.0 and the supporting factors inhibiting learning. The aspects of this research study refer to two components of the learning variable, the initial conditions and the learning method. Aspects of the initial conditions that need to be revealed are the objectives and characteristics of the field of study, the constraints of the implementation of the field of study, as well as the characteristics of students. As for the learning method variable, the aspects of the study are the

organizing, delivery, and management strategies of learning. These two variables are interconnected in order to achieve learning objectives.

Analysis of each of these components is expected to reveal the implementation of character learning in childhood. An in-depth description of the findings of the relationship between two variables in the implementation of character learning will be able to explain the question of how to implement character learning. These various descriptions explain that this research aims to: (1) school readiness in facilitating student learning in the industrial era 4.0; and (2) supporting and inhibiting factors of the implementation of learning in industry 4.0.

## RESEARCH METHOD

The research was conducted using descriptive-analytical methods in the form of case studies. The data collection process was conducted to determine self-learning readiness (SDL) for students of SMK N 2 Depok, Sleman majoring in automotive body repair engineering in the face of learning system 4.0 and supporting and inhibiting factors in implementing learning system 4.0. The study was conducted at SMK N 2 Depok Sleman, automotive body repair engineering department. The population involved in this research is the entire XI automotive body repair department student at SMK N 2 Depok, Sleman, Daerah Istimewa Yogyakarta, Indonesia.

Data collection to measure the level of student's independent learning readiness in dealing with the 4.0 learning system by distributing questionnaires to 30 students in the Automotive Body Repair Technique. The questionnaire used in this data collection used the Fisher Questionnaire. The distribution of questionnaires is done by going directly to the field. The questionnaire results in measuring self-readiness readiness were then analyzed using SPSS Statistics 17.0. The stages of data management in measuring students' self-readiness are (1) data entry editing, (2) data coding, (3) data entry, (4) data cleaning, and (5) data test.

Data entry editing is the process of editing the questionnaire data. Whether there is an incomplete response or the results of the questionnaire obtained in the research are unclear. Data coding is an activity carried out by classifying data and giving a code to each question. The code provided is used as a guide in determining the scores obtained by respondents. Data entry is an activity to enter data into the SPSS Statistics 17.0 program in accordance with a predetermined code. Data cleaning is an activity carried out to double-check the data that has been entered into the computer and whether there is an error or not.

In the data test, the data analysis process that has been obtained previously is based on the results of filling out the questionnaire. These results will be used as an analysis of SDL. The SDL categories that have been analyzed are then classified to determine the categories of student learning readiness. This categorization refers to the categories proposed by [Aruan \(2015\)](#), as can be seen in Table 1.

Table 1. SDL Readiness Category Respondents

Category	Formula
Low	$<X - \text{Standard Deviation}$
Medium	$X \pm \text{Standard Deviation}$
High	$>X + \text{Standard Deviation}$

The results of the data to be analyzed in the SDL category of respondents are seen from the mean obtained in the normality test using SPSS. If the normality test obtained abnormal data, the value that will be included in the SDL formula as data analysis is the median value. After knowing the limits of the SDL readiness category, the next step is to analyze the readiness of students' independent learning from aspects of connectivity with others, discovery and sharing of information, and personal collecting and adaptation of information to deal with the 4.0 learning system. Whereas to find out the supporting factors and inhibitors of the implementation of the learning system 4.0 using data obtained by direct observation and interviews. These factors include internal and external factors.

## RESULT AND DISCUSSION

The results of the analysis of the normality test obtained from the questionnaire using SPSS obtained the results as seen in Table 2.

Table 2. Test of Normality

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
VAR00001	.151	30	.079	.918	30	.024

a. Lilliefors Significance Correction

Based on these results, it is known that the normality test using Shapiro-Wilk obtained results of 0.024. This shows that the data has an abnormal distribution if the value is smaller than 0.05. After finding the abnormal data distribution in the next stage to enter media values into the SDL formula as data analysis, the analysis using SPSS obtained a median value of 90.5 and a standard deviation of 7.52. The results of the analysis of the median value and standard deviation using SPSS can be seen in Table 3.

Table 3. Median and Standard Deviation Analysis

N	Valid	30
	Missing	0
Median		90.5000
Std. Deviation		7.51825

Table 4. Analysis of the SDL Readiness Category

Category	Formulas	Limits
Low	$<X - \text{Standard Deviation}$	$< 82,99$
Medium	$X \pm \text{Standard Deviation}$	$82,99 - 98,01$
High	$>X + \text{Standard Deviation}$	$> 98,01$

The next analysis is to interpret the data results from the readiness to learn independently from aspects of connectivity with others, discovery and sharing of information, and personal collecting and adaptation of information with the SDL readiness category. The results of the average SDLRS scores based on these aspects can be seen in Table 5.

Table 5. SDL Readiness Analysis for 4.0 learning systems

Aspects	Sample Size	Average Score	SDL Category
Connectivity with others	30	92,13	Medium
Discovery and sharing of information	30	82,63	Medium
Personal collecting and adaptation of information	30	89,56	Medium

Based on this, it can be concluded that the average readiness of students' independent learning based on aspects of connectivity with others, discovery and sharing of information, and personal collection and adaptation of information in dealing with the learning system 4.0 is included in the medium category. The category is obtained based on the results of the collection of the average score on aspects of connectivity with others, the discovery and sharing of information, and the collection of personal and information adaptation involving 30 student respondents majoring in automotive body repair techniques with the SDL readiness category. The graph that agrees with the average value of each aspect in the SDL readiness analysis assessment for the 4.0 learning system can be seen in Figure 1.

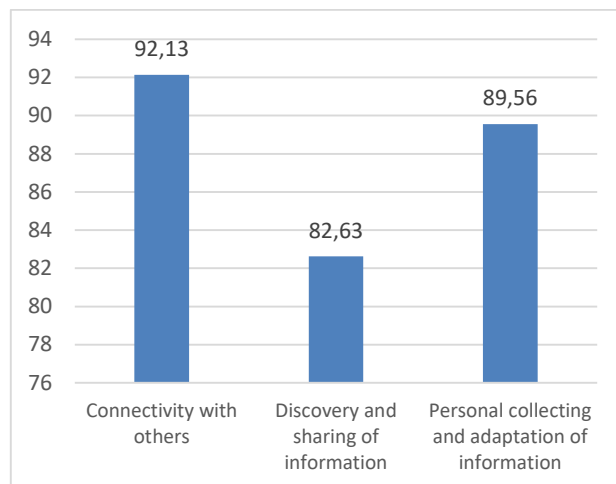


Figure 1. SDL Readiness Analysis Graphic

Figure 1 shows that connectivity aspects with others have the highest score compared to other aspects, with a mean score of 92.13. This shows that in aspects of building connections with fellow students, automotive body repair techniques are good enough or, in this case, included in the medium category. Connections are built manually and already utilizing digital networks and the internet to establish connections. This is reinforced by social media ownership by students, including Twitter, Facebook, Instagram, and WhatsApp. Connectivity with others through a variety of media, both human and digital, and ownership of digital platforms such as smartphones and notebooks that students have, of course, can support students in dealing with learning systems 4.0.

The second aspect is related to the discovery and sharing aspects of information. This aspect obtained an average score of 82.63, with the classification included in the medium category. This is influenced by not all students having a personal blog or a special website that is used maximally for learning related to the subject matter they are learning and dividing it as information. Nowadays, students are more likely to utilize social media platforms as information-sharing media.

The next aspect is related to aspects of personal collecting and adaptation of information. The mean score obtained for this aspect is 89.56. This score is higher than the discovery and sharing aspects of information. This shows that students majoring in automotive body repair techniques personally have a personal collection related to information obtained from various digital media platforms or information obtained directly. This shows that students get a lot of information and immediately adapt to the information received, but only a few explore further and share it with others as learning media either directly or through their blogs. This aspect of the results of the analysis of SDL Readiness is included in the medium category.

The overall average of the three aspects obtained a score of 88.11. This score shows that overall aspects of the independent learning of students of automotive body repair techniques in SMK N 2 Depok, Sleman are included in the medium category. However, students majoring in automotive body repair techniques still have the potential to continue to improve their learning independence. This can be seen from the characteristics and potentially given by automotive body repair techniques in accordance with what was conveyed by [Guglielmino and Guglielmino \(1991\)](#), namely: 1.) Students have learned and are independent in the learning process; 2.) Have responsibility for each learning process that is carried out; 3.) Having a great sense of discipline and curiosity; 4.) Have the desire and enthusiasm for learning and high self-confidence; 5.) Can study time be approved according to what was agreed; and 6.) Have a sense of pleasure and have an interest in completing each of the agreed targets.

The potential supported by these students will continue to be developed and supported by a variety of factors, both internal and external. This becomes very important because developing the potential needed by students to improve learning self-learning will be very supportive in the application of learning systems 4.0. In addition to paying attention to the potential given by students,

some key elements need to be considered to improve SDL readiness. These key elements are expenditures that need to be considered and developed six things discussed are explore, create, collaborate, connect, share and reflect. These six things, together with the potential possessed by students, will be able to give positive results to students' readiness to challenge the learning system 4.0.

#### Supporting and Inhibiting Factors in Learning System 4.0

Based on the results of observations and interviews at SMK N 2 Depok, Sleman majoring in automotive body repair engineering, it is known that there are several supporting and inhibiting factors in the implementation of learning system 4.0. This factor is divided into internal factors and external factors. Internal factors are factors found in the student learning environment in school, while external factors are factors from outside the school.

Supporting factors from the internal side are 1.) Most students majoring in automotive body repair techniques have a high level of activity and initiative, it can be seen from the way of communication, interaction, and activity of students in participating in activities at school; 2.) Some students already understand the development of industry 4.0 and have good digital literacy skills; 3.) Some teachers have used technology to carry out administrative processes and learning processes; 4.) Some teachers are quite active in providing information and giving students the freedom to search for material from various kinds of learning resources that students can access to improve their competence; 5.) SMK N 2 Depok, Sleman majoring in automotive body repair engineering has provided wifi and Internet facilities that students can make; and 6.) All students majoring in automotive body repair techniques have a smartphone and laptop device that can be used as a source of learning and accessing materials that are relevant to the subjects being studied.

Internal factors in supporting the learning system 4.0 originate from internal schools provided by teachers, students, and facilities provided at internal schools. The internal factors published above can be concluded from the internal aspects of both teachers, students, and public facilities that are ready to do the learning system 4.0. Especially in terms of facilities provided by internal parties of SMK N 2 Depok who have been providing internet and wifi service facilities. Also, the computer lab is provided, this is also supported by the ownership of laptops and smartphones, which are expected to be used to access learning materials that are relevant to the competencies being studied and can improve the skills needed.

In addition to internal driving factors, some factors become obstacles from internal aspects. This factor appears to be the most important for students. Obstacles from the internal side are 1.) Students' patterns and behavior are sometimes difficult to control; 2.) Some students still have individual traits that have an impact on the lack of spirit of collaboration in producing work; 3.) Students lack the motivation to maintain facilities and infrastructure that support the learning process; 4.) Lack of technical skills, teacher coding, and analysis in utilizing ICT; and 5.) There is still a lack of understanding among teachers in understanding and possessing skills related to ICT security.

This obstacle can be minimized by the role of the teacher in fostering a spirit of collaboration during the learning process. Also, the teacher also facilitates students. The role of a facilitator for students will positively impact student openness in sharing and discussing teachers and students with students so that patterns and student relationships are easier to control. After studying patterns and studying students or, in this case, the characteristics of students, understanding the teacher as a facilitator will be able to easily invite students by collaborating in exploring material in accordance with the competencies learned in order to produce results obtained from connectivity between students can be shared with those who other as a source of learning.

This is very much one of the key elements in education in the 4.0 era, namely explore, create, collaborate, connect, share, reflect, and explore. Also, this concept supports students who are highly relevant to the resolution of educational technology, namely study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources (Januszewski & Molenda, 2013).

While internal constraints by teachers are related to the lack of teacher skills in understanding related to ICT skills and ICT security levels, this can be minimized by attending ICT

seminars organized by various institutions. This is very important, especially related to the level of ICT security, because the 4.0 learning system is mostly ICT based. If educators do not understand the level of security associated with ICT systems, it will have an impact on the possibility of damage to the system that has been built. For now, some teachers in the automotive body repair major have attended training related to ICT development. However, improvements and improvements need to be made to improve schools supporting the 4.0 learning system being applied positively. Supporting factors from the external side are 1.) Industry support for using ICT in the vocational school environment facilitates the transfer of information related to needs and increases competencies needed by the industry; 2.) Positive support from the community towards the use of ICT so that they can exchange information; and 3.) The strategic location of SMK N 2 Depok, Sleman, makes it possible to get a more stable internet network.

Based on aspects of the external supporting factors provided by SMK N 2 Depok Sleman. This school has collaborated with various industries. One of them is the automotive body repair engineering skills competency in collaboration with Toyota Astra Motor. Also, the school has also cooperated with industries engaged in IT, one of which is the netbook assembly industry, with the concept of cooperation in the form of a teaching factory. In connection with the support of the industry in facilitating the transfer of information about the needs and improvement of competencies needed by the industry, Toyota Astra Motor provides supporting facilities equipped with practical teaching aids specifically designed for automotive body repair. This is also supported by the curriculum used in automotive body repair expertise competencies that have been adapted to the industry curriculum. One of the benefits of using this curriculum is that after students have gained competency in repairing automotive bodies, they can improve competencies that are by what Toyota Astra Motor needs, so they are ready to work.

In connection with the support of the use of ICT in schools, especially in automotive body repair, expertise competencies have provided several computers and multimedia rooms that can be used as a source of learning by students. The industry has provided various materials that can be downloaded or accessed easily by students through computers provided in the classroom or through the multimedia room for further study and discussion by students. This factor supports improvement in the 4.0 learning system because students can learn independently, collaborating to produce work that can be shared to produce positive value in their area of expertise.

Another supporting factor is the positive support from the surrounding environment for the use of ICT in SMK N 2 Depok so that people can exchange information related to the learning system or update developments in SMK N 2 Depok. This system has been implemented with various social media platforms and websites provided by SMK N 2 Depok. The social media and websites owned by this school are managed in real time so that they will provide information to the community updates. This positive support from the community is important to be very important in building the level of community trust in schools. This level of trust and support will positively participate in applying the learning system 4.0.

Supporting factors External factors are supported by the strategic location of SMK N 2 Depok. The location of SMK N 2 Depok is in an easily accessible environment that has a fairly stable internet network. A supportive environment in the stability of the internet network is a positive value for more and more industries to work together using ICT systems and the development of all these external factors becomes a supporting factor for the implementation of learning systems 4.0.

Obstacles from the external side are 1.) Private or government institutions still conduct little training to improve the ability of ICT for teachers or students, so not all teachers can take ICT training; and 2.) No government policy regarding applying the learning system 4.0 to vocational schools exists. External barriers are related to the still lack of teachers who have the ability in ICT, while the private or government institutions related to improving ICT are still very few. The training provider from the private sector or the government is very important in supporting the implementation of the learning system 4.0. Teachers who already have ICT skills coupled with student learning readiness in dealing with the 4.0 learning system will positively impact the process of implementing the 4.0 learning system later.

All of this certainly will not work properly without the support of government policy in implementing the 4.0 learning system. Students' independent learning readiness, teacher ICT skills,



and support facilities will not be able to run without government policies, especially for vocational schools. With the government policy in implementing the learning system 4.0, it will also be followed by educational institutions to implement the decrees and policies issued. Government policies related to the learning system 4.0 will immediately attract the interest of various industries to collaborate with vocational schools using ICT systems. Students' independent learning readiness in a variety of industry-related information in accordance with the expertise competencies that are expected to benefit both parties, educational institutions, or industry.

## CONCLUSION

Based on the results of analysts conducted on independent learning readiness and supporting and inhibiting factors in implementing the learning system 4.0 at SMK N 2 Depok, Sleman majoring in automotive body repair engineering, it is known that the readiness of students' independent learning is based on aspects of connectivity with others, discovery and sharing of information and personal collecting and adaptation of information in dealing with learning systems 4.0 are included in the medium category. However, this category can continue to be improved by increasing several factors that become key elements in dealing with the education system 4.0, namely explore, create, collaborate, connect, share, and reflect. Suppose these key elements can be improved by considering the internal and external potential and supporting factors. In that case, it is expected that students' self-study readiness scores can be increased.

Broadly supporting factors based on the quality of human resources, most of which have used ICT in the learning process and aspects of facilities and infrastructure at SMK N 2 Depok, Sleman has supported the 4.0 learning system. While the inhibiting factor is the lack of technical skills, coding, and analysis that educators have in utilizing ICT, as well as the lack of training carried out by the private sector or government in improving ICT skills for educators or students. At present, only a few teachers have attended ICT-related training. It is expected that later the existence of government policies that support the implementation of the learning system 4.0 can encourage various agencies and institutions to carry out ICT training. This becomes very important because the learning system 4.0 closely relates to ICT. So with the increasing number of training being held, it can equip teachers to deal with ICT-based education systems, especially in the aspect of program security.

The results of the analysis of students' independent learning readiness in facing the future 4.0 learning system can be used as a reference to improve students' self-learning readiness in the high category. The increasing variety of supporting media and the spirit of collaboration is expected to be one of the things that can improve student learning readiness in facing the 4.0 learning system. Also, the factors that become obstacles in implementing the 4.0 learning system can be continually improved and given a solution so that later when the 4.0 learning system is implemented, it can run smoothly.

## ACKNOWLEDGMENT

This work has been supported by Universitas Negeri Yogyakarta. The authors would like to thank the students who answered the questionnaires and the teachers at SMK N 2 Depok, Sleman, for allowing time in their classes for carrying out the research.

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