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Digital Platform Trends in Vocational Education during the COVID-19 Pandemic

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Abstract: The COVID-19 Pandemics has forced the changes of many aspects of life, including vocational education. Schools must adapt to the a new condition of learning activities towards online learning. However, online learning becomes more challenging for vocational schools that focus on practical lessons. The limited access to the internet and technological tools in many remote and rural areas also become main issues in delivering the learning activities. Therefore, teachers and schools need to offer various learning modes and digital platforms to ensure that the students can still get access to the lesson. The study aims to discover the trend in the use of digital transformation of online learning during the COVID-19 pandemic. It is also to find out the best means of delivering the students' education for the future. The study uses a quantitative approach using a simple survey questionnaire to collect the data. The study involved 110 teachers from various vocational schools in Bandung, while the questionnaire was collected using google forms. The data then presented in graphs then analyzed and compared to a literature review from related studies. The study shows that in synchronous learning, Google Meet is the most popular option for video-conferencing (82%). In comparison, video-assisted learning is the most popular (94,45%) in asynchronous learning among vocational teachers. In terms of using the Learning Management System, all teachers use Google Classroom to manage the classes. It is also interesting that most teachers prefer to use more than one digital platform to deliver their lessons. In conclusion, vocational teachers gravitate more towards free, easy-to-use, engaging platforms and require little effort and preparation to operate. They also need flexibility and variations to use digital platforms to adjust the lesson to their capabilities, and the student needs accordingly.

Keywords: Digital platform trends, online learning, pandemic COVID-19

1. Introduction

Corona Virus Disease-19 (COVID-19) has taken the world by surprise after being declared by the World Health Organization (WHO) as a pandemic (Sohrabi, 2019). It changes many aspects of life, including education. The world of education is experiencing changes and accelerating the use of technology as a learning medium. The COVID-19 pandemic has accelerated technology as an educational bridge crossing geographical and time limits (Zhang, 2019). Amid the 21st century, we are required to have 21st-century skills, along with the skills to adapt to the industrial revolution 4.0, which diverts various traditional educational activities towards digital education (Adnan & Anwar, 2020; Asarta & Schmidt, 2020; Muktiarni et al., 2019). Indeed, COVID-19 pandemic asks teachers and educators to think the effective method in teaching to students (Mulyanti, Purnama, &Pawinanto, 2020; Hashim et al., 2020; Sangsawang, 2020;

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Hernawati & Nandiyanto, 2021; Nasution & Nandiyanto, 2021; Huwaidi, Nandiyanto, & Muhammad, 2021; Maryanti, 2021; Ganesha, Nandiyanto, & Razon, 2021; Ramdhani & Nandiyanto, 2021; Nandiyanto et al., 2020).

Learning that is usually performed in a conventional face-to-face interaction has to be carried out virtually. This is one of the alternative ways to do teaching and learning process (Saripudin, Rohendi, & Abdullah, 2020; Maryanti, 2021; Mulyanti, Purnama, & Pawinanto, 2020; Winarni & Rasiban, 2021; Nasution & Nandiyanto, 2021; Huwaidi, Nandiyanto, & Muhammad, 2021; Bermudez et al., 2021; Palma et al., 2021; Ganesha, Nandiyanto, & Razon, 2021; Ramdhani &, Nandiyanto, 2021; Albar et al., 2021). Other than the tools, both students and teachers need to have some degree of digital literacy. The three aspects of learning, namely cognitive, affective, and psychomotor aspects, can be fulfilled accordingly.

Various platforms used in online learning activities have emerged as tools for students' learning process (Dong, Du, & Gardner, 2020; Gunawan, et al., 2020; Saputro & Susilowati, 2019). These learning aids have various challenges and advantages in optimizing learning to achieve learning objectives (Giatman, Haq, & Pratama, 2019). However, the concept of online learning is simply delivering the usual learning practice virtually. Therefore, in general, online learning still needs to pay attention to the general principles of learning, which are: the best-suited curriculum, inclusive, engaging, innovative, effective, has a formative evaluation, summative, coherent, consistent, transparent, and using the device that is easy to operate and use, and cost-effective (Zainul, 2020).

Even though online learning has become necessary since the pandemic hit, delivery still has many drawbacks. Among them is the shift of the teacher's responsibilities to the parents (Li & Wong, 2020) and the struggles to comprehend the lesson faced by some students. Teachers' difficulties controlling the class atmosphere caused by the limit of virtual interaction is another drawback of online learning. However, the most prominent problem of them all perhaps lay in the inadequacy of technology. While it may not be a problem for most students who live in the city, access to the internet and electronic gadgets is a luxury for underprivileged students or those who lived in rural and remote areas. The Ministry of Education reported that 31.8% of students do not have access to the internet during the pandemic, and 15.7% cannot afford a smartphone for online learning (Diab & Elgahsh, 2020). Besides, there are still many students and teachers who are digitally illiterate and struggle to use technology. It becomes especially challenging for vocational schools, focusing on practical learning as the core of education. The condition forces teachers and schools to be more creative and innovative in providing the lessons for the students. To find out the best means to deliver the students' education, it is crucial to determine how the teachers in vocational schools adapt to mandatory online learning. Therefore, the study aims to discover the trend in the digital transformation of online education during the COVID-19 pandemic. By figuring the trend of the digital platform for learning delivery in vocational schools, hopefully, vocational schools in Indonesia can offer more options in using digital platforms and preparing digitalized learning media better, both for students and teachers.

2. Method

This study uses a quantitative approach with a survey design. The subjects of this study were teachers in vocational education spread across the city of Bandung. The teacher who is the subject of this research is a vocational teacher who teaches in public vocational schools in the city of Bandung.

2.1 Sampling and Population

The sample consists of 127 teachers who are involved in teaching in several vocational high schools. Data were collected from April 2021 to June 2021. Respondents were randomly selected for the study, therefore sampling using the random sampling method. The stages carried out in this study consisted of several stages. The first was the preparation of a questionnaire instrument used for data collection.

2.2 Instrument and Data Collection

The development of the questionnaire was carried out using the survey design. Furthermore, the Likert scale survey was used to capture the level of teacher knowledge in using technology in online learning during the covid-19 pandemic. All information is assessed using a score of 5 on a scale of 0 (not very mastered), 1 (not mastered), 2 (less mastered) 3 (quite a mastery), 4 (mastery), 5 (very mastered). Table 1 shows questions regarding the level of teaching literacy in the use of technology in the implementation of online learning.

Table 1 - Tacher literacy in the use of technology in the implementation of online learning

Code	Statement	1	2	3	4	5
LD1	I can run the basic functions of Microsoft Office programs (MS Word, MS Excel, and MS PowerPoint)					
LD2	I can use disbursement pages on the internet such as google and yahoo to find sources of material and references for online learning					
LD3	I can run the basic functions of Microsoft Office programs (MS Word, MS Excel, and MS PowerPoint)					
LD4	I can use disbursement pages on the internet such as google and yahoo to find sources of material and references for online learning					
LD5	I can use various platforms on the internet for virtual face-to-face learning by using various applications such as zoom, google meet, Webex, Microsoft team					
LD6	I can make the task page given to students done online by accessing the learning management system in the online learning					
LD7	I can access online learning media prepared for students related to laboratory learning processes such as virtual laboratories, remote laboratories, expert systems					

After collecting data on the level of knowledge and skills of teachers in integrating technology in the implementation of online learning, then we collect data on what teachers use during the implementation of online learning with several question items and using yes or no answer choices for the use of online learning digital platforms during the pandemic covid-19. In this study, the instrument was given to the teacher by asking several questions to find out the trend of digitization in the implementation of online learning during the covid-19 pandemic. The questions posed to the teacher regarding the use of technology during learning are divided into three major parts, namely the use of technology in the implementation of Synchronous Learning, during daily Learning, and the use of the Learning Management System. For each item found 4 questions, the questionnaire was designed and managed using a question form sent via WhatsApp and email. Table 2 shows 12 questions related to the use of technology in the implementation of online learning carried out during the covid-19 pandemic. Each question has a maximum score of 1. If the respondent answers 12 questions correctly, the maximum score obtained is 100. Correct answers are then calculated using:

$$\text{Score} = \frac{score\ obtained\ by\ student}{3} \text{ x } 10 \qquad (1)$$

Table 2 - Questionnaire digital transformation trends in vocational education for the post-covid-19

Code	Use of Technology in Learning	Yes	No
	Syhcnrnouse Learning		
PT1	I use the internet platform for virtual face-to-face learning using the zoom app		
PT2	I use the internet platform for virtual face-to-face learning using the Google Meet application		
PT3	I use the internet platform for virtual face-to-face learning using the Webex application		
PT4	I use the internet platform for virtual face-to-face learning using the Microsoft team application		
	Asyhcnrnouse Learning		
PT5	I use Video-Assisted Learning learning such as animated videos or video tutorials to help the learning process, especially in delivering practical material		
PT6	I use Gamification during the learning process to hone students' skills in learning		
PT7	I use the Virtual Laboratory as a means of practical learning when learning online		
PT8	I use the Remote Laboratory as a means of practical learning during online learning		
	Learning Management System		
PT9	I use the Google classroom platform to facilitate online learning		

Code	Use of Technology in Learning	Yes	No
PT10	I use the Edmodo platform to facilitate online learning		
PT11	I use the Moodle platform to facilitate online learning		
PT12	I use the Schoology platform to facilitate online learning		

2.3 Data Analysis

There were a total of 127 respondents who filled out the questionnaire, but some of them were found to be incomplete, therefore the data analyzed were 110. Finally, the researcher collected data quantitatively from a questionnaire online using the Google Form (Creswell, 2012; Boone et al., 2012). The data obtained from the questionnaire was presented in tables (Table 1, Table 2) and diagrams (Figure 1, Figure 2) to determine the level of student readiness for online learning during the COVID-19 pandemic. The survey data were analyzed in a descriptive quantitative analysis by using Microsoft Excel 2013, which is tabulated and calculated as a percentage. Analysis of data in percentages is used to determine to see the trend in the use of digital transformation of online learning during the COVID-19 pandemic.

3. Results and Discussion

3.1 Demographics

This study uses an instrument to see the use of technology in online learning during the covid-19 pandemic. The teachers who were the subjects of the research came from several schools spread across the city of Bandung. The survey was collected from 127 teachers spread across several vocational education schools. Figures 1 and 2 show the data on the sex and age distribution of the respondents, of 127 teachers 42 were female (33,1%) and the remaining 85 were male (66,9%). Most of the 102 (80.3%) of the teachers were aged 20-35, and a small portion of 25 (19.7%) were aged 36-50 years.

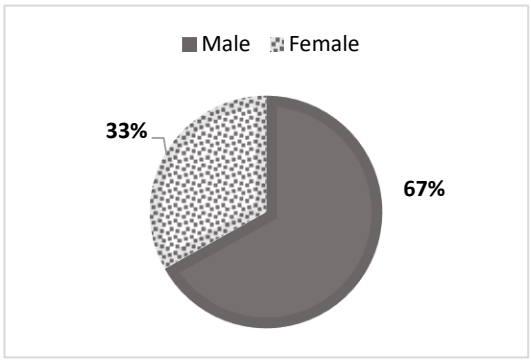

Fig. 1 - Gender distribution of respondents

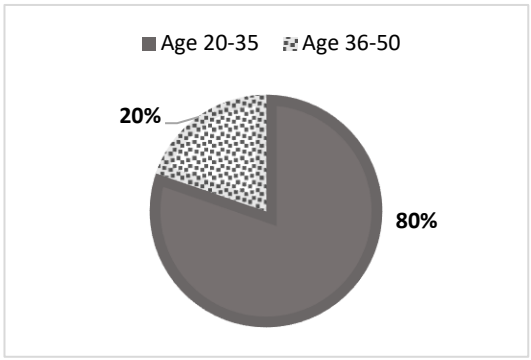

Fig. 2 - Age distribution of respondents

The distribution of respondents is based on gender and age, then it is seen how the level of digital literacy of teachers in the implementation of online learning. Table 3 shows the literacy level of digital teachers, namely knowledge of courage learning platforms, ability to carry out basic Microsoft Office program functions (MS Word, MS Excel, and MS PowerPoint), ability to use discovery pages on the internet such as google and yahoo to find resources. materials and references as online learning, the ability to use various platforms on the internet for virtual face-to-face learning using various applications such as zoom, google meet, Webex, Microsoft team, the ability to create task pages given to students online by accessing the learning management system in online learning and the ability to access online learning media that provides students with related laboratory learning processes such as virtual laboratories, remote laboratories, expert systems. Digital literacy that teachers have in integrating technology during online learning.

Based on Table 3, more than half of the teachers as much as (90%)of teachers are very familiar with the basic functions of Microsoft Office programs (MS Word, MS Excel, and MS PowerPoint), all teachers (100%) are very good at using disbursement pages on the internet such as google and yahoo to find sources of material and reference as online learning, more than half of the teachers (89%) mastered using various platforms on the internet for virtual face-to-face learning using various applications such as zoom, google meet, Webex, Microsoft team, more than half of the teachers (86%) mastered in creating pages the tasks given to students are done online by accessing the learning management system in online learning and more than half of the teachers (65%) are quite proficient in accessing online learning media prepared for students related to the laboratory learning process such as virtual laboratories, remote laboratories, expert system. Technological literacy is the involvement of activities from start to finish and science to seek problem-solving and expand capabilities in the use, regulation, understanding, and assessment of innovations (OECD, 2018; Peña-López,

2016). Digital learning can create learning that makes educators and students more creative, actively participate, diverse, and comprehensive. To achieve good digital learning, teachers must be able to prepare themselves (Coman, et al., 2020).

Table 3 - Tacher literacy in the use of technology in the implementation of online learning

Code	Statement	Not Mastered	Less Mastered	Quite Mastery	Mastery	Very Mastered
LD1	I am able to run the basic functions of Microsoft Office programs (MS Word, MS Excel, and MS Power Point)	0%	0%	0%	10%	90%
LD2	I can use disbursement pages on the internet such as google and yahoo to find sources of material and references for online learning	0%	0%	0%	0%	100%
LD3	I can use various platforms on the internet for virtual face-to-face learning by using various applications such as zoom, google meet, Webex, Microsoft team	0%	0%	11%	89%	0%
LD4	I can make the task page given to students done online by accessing the learning management system in the online learning	0%	0%	14%	86%	0%
LD5	I can access online learning media prepared for students related to laboratory learning processes such as virtual laboratories, remote laboratories, expert systems	0%	35%	65%	0%	0%

3.2 Digital Transformation Trends in Vocational Education for the Post-Covid-19

The COVID-19 pandemic has increased technology in education, and digitalization in learning has become a trend. Educational institutions from elementary school to university level are required to use technology and online learning. As digital transformation is an essential aspect of the online learning process, digitization significantly impacts distance education. Therefore, the adoption of technology in the learning process is a must for all educational institutions. In the new adaptation period, educational institutions must continue to ensure the continuity of learning according to the plan. The material can still be delivered to students, specifically providing necessary skills for students in vocational education.

However, as discussed before, there are still many problems with the delivery of online learning. It is important to provide some degree of flexibility and variation for the students. Therefore, the learning process is carried out by two modes, which are synchronous and asynchronous. Moreover, to overcome the problems in the use of technology and digitalization in learning, teachers must use various learning platforms to implement online learning. Teachers have to adjust in using platforms to meet the needs of the students and how to organize the learning activities in a semester. Table 4 shows the implementation of synchronous learning used during online learning during the COVID-19 pandemic.

Table 4 - Use of technology in synchronous learning

Code	Use of Technology in Learning	Yes		No	
		N	%	N	%
PT1	I use the internet platform for virtual face-to-face learning using the zoom app	50	45%	60	55%
PT2	I use the internet platform for virtual face-to-face learning using the Google Meet application	90	82%	20	18%
PT3	I use the internet platform for virtual face-to-face learning using the webex application	0	0%	110	100%
PT4	I use the internet platform for virtual face-to-face learning using the Microsoft team application	0	0%	110	100%

Based on Table 4, it is clear that google meet is the most popular video conferencing platform used in vocational schools as 82% of the population use it. Zoom meeting is the second most popular platform, with 45% of respondents. It also shows that 27% of the respondents alternate using both google meet and zoom meeting. On the other hand, there are no respondents who use Microsoft Team and Webex. Among the four video conferencing platforms, it makes sense why google meet becomes the most popular. Compared to the other three, google meet provides a free service without any time limit. It is also easier to use as there is no need to sign up for a separate account other than google, as many students and teachers in Indonesia are already familiar with the platform. While other platforms also provide a free service, some constraints are identified, such as the time limit, the users' unfamiliarity with the interface, and some features that are

only available for premium paid accounts. However, zoom meeting is still widely used despite having paid membership option and time limit for a free account. It is because zoom meeting is known to be more user-friendly and can hold a large audience than its competitors (Rashid, Salih, & Budur, 2020)).

The use of video conferencing tools in synchronous learning is crucial as it still needs to maintain the interaction that normally occurred in class. Although virtually, teachers and students can meet face-to-face simultaneously, as in the classroom, to carry out learning. The synchronous model makes students comfortable because students can get material directly from the teacher, despite having the disadvantage of making the students disinterested if carried out for too long. The systematic learning model will be effective if used as support for students when students do not understand the learning material (Perveen, 2016). Students can directly ask questions when they do not understand the learning material. The implementation of the cycle will be very effective if it is carried out accordingly in a proportionate manner. The implementation of the cycle can motivate students with notes carried out according to needs (Martin & A. Parker, 2014). Teachers must understand the characteristics and needs of students during the implementation of online learning, and teachers must be able to design virtual classes according to the content of the material to be delivered to students (Hyder et al., 2017). The implementation of online learning must be planned so that the teacher can choose which ones will be carried out in synchronous mod and which materials will be delivered in asynchronous mode. However, as non-stop video conferences can be monotonous and exhausting, online learning can also use Asynchronous mode to make a dynamic online learning delivery. Several means of asynchronous learning mode can be seen in Table 5.

Table 5 - Use of technology in asyhcnrnouse learning

Code	Use of Technology in Learning	Yes		No	
		N	%	N	%
PT5	I use Video-Assisted Learning learning such as animated videos or video tutorials to help the learning process, especially in delivering practical material	105	95.45%	10	9.09%
PT6	I use Gamification during the learning process to hone students' skills in learning	98	89.09%	12	10.91%
PT7	I use the Virtual Laboratory as a means of practical learning when learning online	10	9.09%	100	90.91%
PT8	I use the Remote Laboratory as a means of practical learning during online learning	5	4.55%	105	95.45%

Table 5 shows that in asynchronous mode, most teachers (94.45%) use video-assisted learning to deliver material to students. The overwhelming popularity of asynchronous learning might be contributed by the teachers' familiarity with using videos in the learning process. Several years before the pandemic, the use of learning videos was well known. They could be a stimulus to students to understand better the content of the material, especially for practical material in vocational education (Warju et al., 2020). Using video is becoming increasingly booming when online learning is implemented, where students learn through computer screens. Video-assisted learning also gives flexibility for the students to revisit the lesson in their free time as there is no time bound to watch them. In a situation where internet access is not always available, it can be a good alternative. The variations of video learning used in the learning process can be broad and include video tutorials, animation ideas, motion graphics, etc. These learning videos are beneficial for enriching lessons and making complex content easy to understand. Therefore, it can improve student learning outcomes and reduce teachers' workload (Orús et al., 2016).

Moreover, other than familiarity, videos are relatively easy and affordable to make and requires minimum effort and preparation. In addition to the use of videos in teaching, teachers also use games to attract students' interest and motivation in online learning. Surprisingly, 89.09% of teachers choose gamification in delivering learning materials. The use of games in the learning process can change the learning process to be more fun and interesting, gamification is one of the educational technology trends that is very suitable for use in online learning (Cózar-Gutiérrez & Sáez-López, 2016). Students will be actively involved in playing games designed specifically by the teacher during the learning process. Games can create a more relaxed learning environment for students. The adoption of gamification has been widely used in the learning environment. It has a positive impact on the student learning process (Licorish et al., 2018). Like video-assisted learning, the game in learning is also relatively easy to make as many platforms provide interactive games for education for free. With minimum effort and preparation, both video-assisted learning and gamification offer students fun learning activities and flexibility of access.

On the other hand, remote laboratory and virtual laboratory use are still very minimum, which can be seen from the percentage (4.55% and 0.09%, respectively). The use of remote and virtual laboratories greatly facilitates student understanding in the implementation of learning, especially in practical learning (Monzo et al., 2021; Corter et al., 2011). However, it is still rare to integrate because the design requires a large amount of money. Besides, as online learning occurs because of the sudden Covid-19, preparations for developing learning tools have not been maximized. It should be acknowledged that the target schools for this study already have remote laboratory and virtual laboratory facilities,

which makes it possible for them to have those options. In many other vocational schools, these options may not be available at all. The fund and preparation needed to deliver a lesson using virtual and remote laboratories are one of the reasons why both methods are not popular among vocational teachers. It is also interesting to note that 88.18% of the respondents use more than one media in delivering the lesson. It shows that most vocational teachers in Indonesia in asynchronous learning prefer variation in their teaching delivery.

The implementation of online learning requires optimal preparation. Teachers must be able to design learning as attractive as possible so that students will not feel bored (Mohamad & Masek, 2021; Ahmad, 2021). Therefore adequate facilities are needed for the implementation of online learning. One of these facilities is the learning management system (LMS). Table 6 shows the use of LMS among vocational teachers.

Table 6 - Use of technology in learning management system

Code	Use of Technology in Learning	Yes		No	
		N	%	N	%
PT9	I use the google classroom platform to facilitate online learning	110	100%	0	0%
PT10	I use the Edmodo platform to facilitate online learning	50	45.45%	60	54.55%
PT11	I use the Moodle platform to facilitate online learning	20	18.18%	90	81.82%
PT12	I use the Schoology platform to facilitate online learning	0	0.00%	110	100.00%

Based on Table 6, all respondents (100%) chose to use Google Classroom to implement online learning, while less than half of the respondents (45.45%) decided to use Edmodo. Only a small proportion of respondents (18.18%) choose to use Moodle for their LMS, and the teachers do not use Schoology. It also means that 63.63% of teachers use more than one LMS platform to manage the class and the lesson. As other platforms discussed before, google classroom as a free LMS provider is used by all respondents. It becomes the preferred option because most teachers and students are familiar with google; therefore, they do not have to adapt significantly to the interface of Google Classroom.

On the other hand, Edmodo and Moodle become the next popular LMS option (45.50%and 18.18% respectively) as they are also free to use. However, Google Classroom offers a friendlier user experience and integration with other Google services such as google drive, google docs and google spreadsheet. However, Schoology is not yet become a considered option for vocational teachers in Indonesia. Therefore, while also provide a free LMS platform, the schools/users still need to pay to use more advanced features of the platform.

The use of a learning management system in learning becomes a demand when learning is carried out online. This is done to monitor all student learning activities and activities (Yueh & Hsu, 2008). With the emergence of various learning management systems that support technology-based learning, the Learning Management System is expected to make students more independent, creative and facilitate learning that can be done anywhere and anytime (Lasmanawati et al., 2021). LMS has the scope of administration, delivery of materials, assessment, monitoring, and communication. In addition, pedagogic and professional competency materials made with multimedia packaging (text, animation, video, sound) in the LMS will accelerate (accelerate) the mastery of science and technology (Abdulrahaman et al., 2020). The range of the online learning process from preparation, implementation to the evaluation process is designed as much as possible so that the online learning process can be exciting and student learning outcomes can be achieved optimally.

In general, teachers have mastered technology in the implementation of online learning, several factors that influence the success of the implementation of online learning, ranging from the age factor, infrastructure, and gender. Some research results have offset gender preferences in online learning, which may cause no significant gender differences to be revealed in online learning outcomes (Mulyahati & Rasiban, 2021; Ibrahim et al., 2020). Findings regarding gender differences in online learning outcomes tend to be inconsistent and even paradoxical. In mastering technology, women are shown to be more persistent and engaged than men, while men tend to have more stable positive attitudes towards online learning (Andrieu, et al., 2019). While women have stronger self-regulation than men in the context of online learning (Alghamdi et al., 2020).

4. Conclusion

Online learning is unavoidable for all schools globally, and vocational schools in Indonesia are no exception to that condition. The teachers and schools need to be creative to solve the problems that come with online learning. The study shows how much the teachers and students have used technology and various digital platforms to adapt to the situation and overcome shortcomings. As many students do not have equal access to the internet and technological tools and avoid delivering ineffective and monotonous lessons, teachers must alternate between using synchronous and asynchronous modes in teaching. In synchronous learning, vocational teachers in Indonesia mostly prefer to use Google Classroom, while video-assisted learning is the most popular medium to deliver the lesson in asynchronous mode. On the other hand,

all teachers use google classroom to manage their classes and lessons. Most of the teachers also use more than one digital platform in delivering the class. It shows that vocational teachers in Indonesia need variations and flexibility to teach their classes virtually. Interestingly, the prevalent use of digital platforms in synchronous, asynchronous mode and the learning management system shows similar results. While other options may offer advanced and arguably more sophisticated features, vocational teachers in Indonesia gravitates more towards platforms that are free, easy to use, engaging, and requires little effort and preparation to operate. To open the opportunity for teachers and students to explore a wide range of digital platforms, those platforms should first offer some degree of familiarity and easy access to all users. In more advanced learning, such as virtual and remote laboratories, the schools should be prepared in terms of the physical facilities and the digital literacy for the teachers to operate and use the platforms. However, further study is required to provide more detailed information about the cause of the digital platform use among vocational teachers.

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