Implementation of e-learning by vocational-school teachers of mechanical engineering

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ABSTRACT

Electronic-based learning, commonly called e-learning or online learning, has become an important component of learning in vocational high schools, considering the need to prepare students to face future challenges. The aim of this study is to evaluate teachers' readiness for online learning, identify difficulties faced by teachers, identify the e-learning platforms used, and examine the learning methods used. The research respondents were 118 vocational school teachers in mechanical engineering throughout Indonesia. The research instrument was a questionnaire distributed online using Google Forms, and the results were analyzed using descriptive statistics. The study results revealed that most Mechanical Engineering Vocational School teachers stated that they were not ready to implement e-learning, and the readiness of productive teachers was lower than that of adaptive teachers. The main difficulties experienced by teachers in e-learning are in the aspects of learning facilities and implementation of the learning process. The digital platform most used by teachers is social media, followed by video conferencing, and LMS is the platform that is used the least. Teachers have implemented student-centred learning methods combined with teacher-centred learning in online learning. Learning innovation is needed to integrate methods, platforms and media that can accommodate teachers' difficulties, especially for productive subjects that require practice to form hard skills competencies.

Keywords: online learning, vocational, LMS, social media, video conference

INTRODUCTION

Electronic-based learning commonly called e-learning or online learning, has become an important component in modern education. Implementing e-learning in vocational schools is very important, considering the need to prepare students to face future challenges. The use of e-learning also helps in developing skills that are relevant to industrial developments in the digital era. E-learning provides wider and more flexible access to education, the impact of which can facilitate collaboration with students and teachers in various places within one country or between countries. The application of e-learning in emergency and crisis conditions, such as the COVID-19 pandemic and natural disasters, is the right choice for learning mitigation at various levels of education. The integration of e-learning in the vocational school curriculum is a strategic step that must be taken to improve the quality of education and student work readiness.

Many platforms and learning methods can be used online to help teachers and students in the learning process achieve the expected student competencies. This learning platform and method has several advantages over conventional methods. E-learning-based online learning methods can build a comprehensive and interactive communication mindset for teachers, students, and the academic community (Budi & Brian, 2012). E-learning is an electronic learning system which utilizes information technology to create and distribute learning materials to students. Broadly speaking, e-learning is categorized into two groups: (1) synchronous e-learning,

namely real-time online learning, for example, webinars, virtual classes, and video conferences. and (2) asynchronous e-learning, namely online learning, free to do at any time because it does not require mentors and students to be online together, for example, learning videos from the Learning Management System (LMS).

E-learning using modern tools of Information and Communication Technologies (ICT) has become an integral component and a driving force behind the teaching and learning of engineering courses. Educational activities that combine pedagogy and technologies can deepen and widen learning spaces in a way that promotes students' higher-order thinking skills, high level of interaction among communities of learners, flexibility in learning, active and social presence, collaboration, reflection, and new learning skills (Dacre et al., 2019; Elkington & Bligh, 2019). In the future, e-learning can be used as a superior alternative learning method because it is felt to be quite effective and efficient in implementing and evaluating learning. All educational programs at schools can still be delivered to students via online media (Aji, 2020). E-learning-based learning methods are very helpful when learning online because learning activities cannot take place face-to-face onsite.

Teachers can use LMS to convert learning materials into various media formats, for example, text, audio, graphics, animation, video, downloadable software (Yuhanna et al., 2020), games and interactive simulations. Variations in media make learning activities more varied. (Lien, 2023) to suit needs and, of course, students benefit. Apart from not making you bored, the material becomes easier to understand because the use of information technology makes the material more interactive, real, and visually attractive. The following findings reveal that e-learning provides scientific material in an interesting way (Rawashdeh et al., 2021). Teachers also benefit from learning management from the use of e-learning, namely the automation of administrative processes (Al-Handhali et al., 2020; Liu et al., 2019). This means that all processes that were previously manual can be carried out by the system. Starting from distributing modules, collecting assignments, distributing grades, and holding exams. The key is in the e-learning creation platform that suits your choice. Each e-learning creation platform offers special features like scheduling face-to-face activities, consultation activities, assessments, etc.

Another benefit of LMS in e-learning is that you can access material anywhere and anytime. Teachers and students do not have to come to school or the office. E-learning allows teachers and students to access materials wherever and whenever they wish (Gadzhibabayeva, 2021; Akhter et al., 2021). Even though teachers and students do not meet in person, e-learning can still be done. When you can't attend, the class is still documented by recording so students don't miss the material. Users can download or study material anytime and anywhere if connected to the internet. This system utilizes cloud computing as material storage and is connected to the internet. If the material document is deleted, the user must download it again if the cloud still has it. Moreover, if the teacher chooses the asynchronous learning model, the learning process can be more flexible because this model is pause-and-resume. The benefits of this flexibility can be obtained from an LMS (Elsayed, 2022). That way, the learning process can be stopped and continued according to student needs. Of course, this makes it easier for students to regulate their learning rhythm so that they learn when they are ready.

The e-learning method allows students to get maximum lesson material from the teacher. E-learning teaching materials can continue to be accessed by students as long as there is an internet connection so that students can study the material independently, even without direct teacher assistance. The e-learning environment also helps students or learners to rely on themselves so that the instructor is no longer the only source of knowledge but acts as a guide and advisor (Joshua et al., 2016). The positive impact is that students become more independent in making decisions, and learning is not solely centred on the teacher. In line with the statement that e-learning using LMS increases student autonomy (Prasetya, 2021). Students can explore their abilities and gain new experiences from various online learning sources, be more creative, and develop skills in the ICT field.

E-learning is beneficial not only for teachers and students but also for students as a varied learning medium. For e-learning providers, operational costs can be more economical (Muruthy & Yamin, 2017). Expenditures for physical classes, infrastructure maintenance, transportation,

and so on are not as much as onsite. Someone interested in doing business in the world of education does not need to provide a physical building first to open classes. Of course, the costs can be cheaper, and investment can be diverted to preparing high-quality internet and e-learning equipment.

However, the negative impact is less close psychological distance between students and teachers. E-learning, in certain cases, is solitary and contemplative, resulting in a lack of interaction between students and between students and teachers (Arkorful & Abaidoo, 2014; Islam et al., 2015; Al-Rawashdeh et al., 2021). Students cannot develop technical competencies optimally and lack social interaction experience. As a result, students become shy, less courageous, and less confident in conveying their ideas, and even avoid interacting with other people (Akhter et al., 2021). On the other hand, the lack of adequate facilities and infrastructure for teachers and students to deal with online learning is also a real weakness. The main means are cell phones, personal computers, or tablets (Salloum et al., 2019). Meanwhile, there are obstacles related to infrastructure in online learning, such as difficulty connecting in some places. This internet connection problem is most often encountered in implementing online learning, as reported (Zakaria et al., 2020; Biney, 2020; Uong et al., 2022; Peneda et al., 2023; Lien, 2023).

The teacher must master appropriate learning methods in delivering teaching material during online learning. The teacher must also master the platform used when delivering the material. Not all teachers are ready to use Internet technology or social media as a learning tool (Purwanto et al., 2020). Lack of adequate technical support and technical skills has been identified as a major barrier for teachers and students in integrating LMS into the learning process (Suzanne et al., 2019; Al-Handhali et al., 2020; Elsayed, 2022). Instructors need to have a series of skills in the field of information and communication technology (ICT) and utilize them for the teaching process (Aithal & Aithal, 2016). If the method implemented is good but the existing platform cannot be used as optimally as possible by the teacher, this will result in a lack of competency achievement. expected by teachers and students.

The crucial negative impact felt by vocational school students is that online learning results in practical subjects being replaced with theoretical and conceptual-based subjects or even being eliminated. Consequently, students have difficulty achieving practical learning competencies that emphasize hands-on optimally. Therefore, this research aims to reveal teachers' readiness for online learning, including the difficulties faced, their preferred e-learning platforms, and the learning methods used within the online learning framework in vocational schools. This survey has a strategic role in improving the quality of online learning in vocational schools in the future, considering that online learning offers benefits and positive impacts.

METHOD

This research uses a survey method. The survey was imposed on vocational school teachers in Mechanical Engineering, most of whom are teachers who teach practical subjects or are productive. The number of teachers who were respondents to this research was 118 people. The distribution of respondents can be seen in Table 1.

The reason for selecting respondents is that, with the implementation of online learning, productive teachers are the ones who have the most difficulty doing it. Respondents came from all regions in Indonesia. Respondents were asked questions covering four aspects that show a portrait of the implementation of e-learning in vocational schools: teacher readiness, difficulties experienced, e-learning platforms used, and learning methods applied, as seen in Figure 1.

The research instrument for collecting data was a Google form questionnaire. The questionnaire was validated by a focus group discussion (FGD) involving six experts in education, informational technology, and instructional methodology. Shared via the Google form, the questionnaire asked the respondents to respond on their teaching readiness using the E-learning platforms, the types of platforms they often use, and the instructional strategies applied in running the online learning. The subject matters related to the field of mechanical engineering, both theories and practicums. At the end of the questionnaire, respondents were to write about the difficulties and handicaps they encountered in running the online learning sessions. They were

also asked about their views and points concerning the solutions to these handicaps and difficulties. Data were analyzed using descriptive quantitative statistic techniques.

Table 1. Respondent data

No	Data of Respondents	Frequency (f)	Percentage
1	Province		
	East Java	50	43%
	Special Region of Yogyakarta	24	42%
	Central Java	18	20%
	South Sumatra	6	15%
	West Java	5	5%
	Banten	2	4%
	South Borneo	2	2%
	East Nusa Tenggara	2	2%
	Gorontalo	2	2%
	Lampung	2	2%
	East Borneo	2	2%
	West Nusa Tenggara	2	2%
	Jambi	1	2%
2	Institution		
	Public Institution	95	81%
	Private Institution	23	19%
3	Subjects		
	Adaptive	28	24%
	Productive	90	76%
4	Teaching Experience		
	1-5 Years	27	23%
	6-10 Years	18	15%
	11-15 Years	27	23%
	> 15 Years	46	39%
5	Background Education		
	Bachelor	96	81%
	Magister	22	19%
6	Gender		
	Male	69	58%
	Female	49	42%

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                The Implementation of E-Learning
                    in Vocational Schools

    Teacher       Difficulties                      Learning
    Readiness     Experienced    Platform Used    Methods Applied
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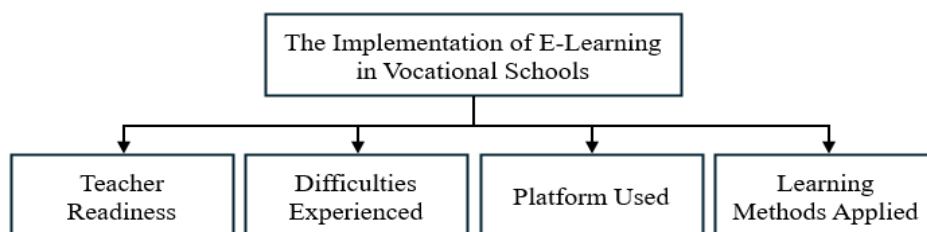
Figure 1. Four Aspects of the E-Learning Implementation in Vocational Schools

FINDINGS AND DISCUSSION

Findings

The survey results show teachers' readiness to implement online learning. Information was obtained that 44.4% of teachers stated that they were ready to carry out online learning using various digital platforms. Meanwhile, 55.6% said they were still not ready to face the online learning process. The readiness of productive teachers in online learning is lower (39%) than that of adaptive teachers (50%), as seen in Figure 2. Adaptive teachers are the term for those who teach expertise basic subjects, while productive teachers are the term for those who teach expertise competency subjects.
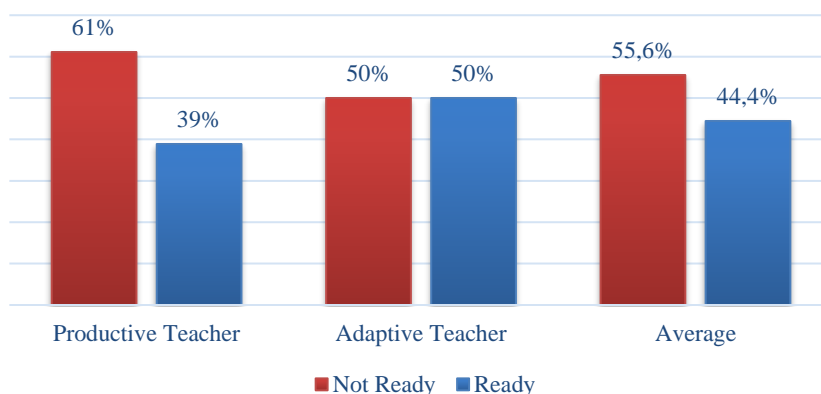
Figure 2. Productive and Adaptive Teachers' Readiness in Online Learning

The difficulties experienced by teachers vary and have been identified. These difficulties are categorized into 4 aspects: facilities, learning process, teacher ability and student ability. The aspects and descriptions can be seen in Table 2.

Table 2. List of difficulties for productive and adaptive teachers in online learning

No	Aspect of difficulties	Description of difficulties
1	Resources	Cellular phones do not support/compatible; Internet connections are slow; not having signal quotas; cellular signals are unstable; electricity blackouts; incompatible software.
2	Instructional processes	Practicum activities cannot be directly conducted; learning activities are not effective; boredom with online learning; instructional material cannot be delivered thoroughly; complicated student-teacher interaction; lack of time; students' understanding cannot be monitored; not all students can take synchronic classes; difficulty in giving examples of practicum materials, difficulty in the class schedule.
3	Teachers' competencies	Developing IT-based materials and media; keeping up with computer technology, using applications that support instruction.
4	Students' conditions	Unstable learning motivation; low proficiency in science and technology; low level of participation; passive students; low level of reading interest.

Data regarding the number of difficulties based on type expressed by productive and adaptive teachers in implementing e-learning is presented as a histogram (Figure 3).
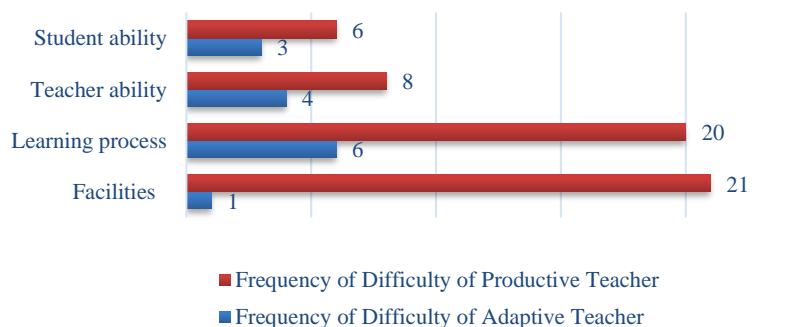

Figure 3. Frequency of Difficulty of Productive and Adaptive Teacher

Based on the data from the analysis, the difficulties in implementing online learning mainly come from the aspect of facilities (internet connection and software compatibility) and the learning process. Teacher difficulties caused by teacher ability in online learning are apparently greater than teacher difficulties caused by student ability. This means that constraints related to teachers' abilities in online learning are more dominant than constraints related to students'

abilities. The reason this condition occurs is that teachers have difficulty creating media and teaching materials that are suitable for online learning.

Implementing online learning certainly requires a platform. The types of digital platforms used for online learning by vocational school teachers based on the results of this survey are presented in Figure 4. In this survey, digital platforms for online learning are grouped into 3 types: social media platforms, LMS, and Video Conference. Social media is used by 104 vocational school teachers.
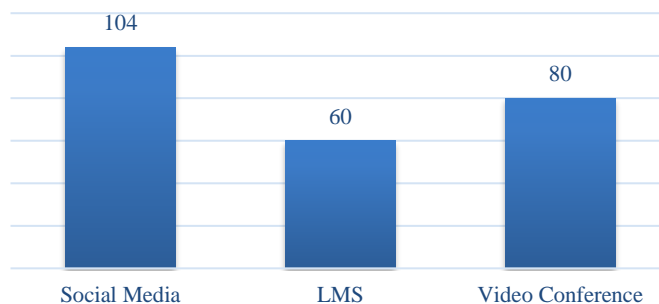

Figure 4. Frequency Data on Platform Use by Teachers in Online Learning

The most widely used social media is WhatsApp by 104 vocational-school teachers. Further identification showed that of the 104 vocational school teachers who used WhatsApp, 3 teachers also used Telegram. The survey results also show that the video conference platform is used by 80 vocational-school teachers for online learning. Video conferencing via Google Meet was used by 67 teachers, while video conferencing via Zoom Meeting was used by 49 teachers. Based on this data, it can also be said that teachers' understanding and mastery of LMS are still very lacking. The LMS platform is only used by 60 teachers. The LMS most widely used in online learning is Edmodo, with 34 teachers using it. Further identification shows that Google Classroom is used by 25 teachers, and Microsoft Office 365 is used by 6 teachers.

The learning methods used by vocational-school teachers during online learning are expected to use student-centred learning (SCL) methods, not just teacher-centred learning (TCL). Teachers should implement a combination of SCL and TCL so that the interaction that occurs is the student's learning process, not the teacher's teaching process. Methods that support SCL include discussions, projects, simulations, demonstrations, assignments, and peer teaching. Methods that are by TCL include the lecture method. The learning methods teachers apply in online learning after being grouped according to SCL, TCL, and a combination of SCL/TCL can be seen in Figure 5. Most teachers (88.98%) have implemented a combination of TCL and SCL. Meanwhile, only 4.24% of teachers implemented TCL and 6.78% of SCL. Based on this data, it can be said that the online learning implemented has implemented student-centered learning, because only 4.24% implemented TCL.
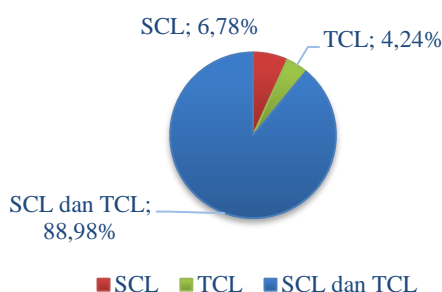

Figure 5. Implementation of SCL and TCL Based on the Learning Methods Used by Teachers

Discussion

The low readiness of productive teachers compared to the readiness of adaptive teachers is because adaptive subjects are basic subjects that support expertise and are theoretical and conceptual in nature, so they are more flexible to be implemented online. Meanwhile, productive subjects are the main subjects for training expertise and are practical for directly training hard skills in the workshop. Packaging practical learning into e-learning is not an easy challenge. Simulation and virtual technologies are required, and specific strategies must be implemented. This is a challenge for productive teachers in the future. The readiness of vocational school teachers in the field of mechanical engineering to implement e-learning is in the low category because all teachers should be ready to carry out online learning or mixed online and offline learning to facilitate student learning activities. Teacher readiness in implementing online learning impacts the learning outcomes that must be achieved. The lower the readiness, the lower the learning outcomes students will master because the delivery is inefficient. In fact, online learning positively impacts student character, namely curiosity, initiative, resilience, adaptation, leadership, and ethics when online learning takes place (Dalimunthe et al., 2022).

Teachers' unpreparedness in implementing online learning causes the learning process to be less effective, especially for practical learning. Difficulties faced by teachers in implementing online learning include technical and non-technical aspects. Difficulties in the technical aspects are (1) inadequate internet connection, (2) teachers' lack of understanding of IT use, and (3) online learning platforms that teachers lack control over. Based on the difficulties faced by teachers show that teachers' TPACK (Technological Pedagogical Content Knowledge) abilities are still very limited, especially from the aspect of mastering technology. The difficulties faced by teachers in non-technical aspects are (1) the hassle of controlling student participation during online learning, (2) choosing the right media and learning methods, (3) limited interaction between teachers and students, and (4) difficulties in creating interesting practical subject teaching materials for students through online learning. Based on this phenomenon, it can be said that most teachers lack mastery of TPACK, so it can be assumed that students' learning outcomes face problems in achieving theoretical and practical competencies.

There are many things that must be prepared further by the teacher concerned. Such as supporting learning facilities and infrastructure, the teacher's mental readiness, and learning patterns must also be adapted to the online learning model. The delivery of material and preparation of modules and learning media created by teachers is still very lacking in online learning at vocational schools. This is because most teachers cannot keep up with technological developments in using IT in learning. The results of the research (Martini et al., 2022) show that online learning runs smoothly at Pedungan 11 State Elementary School because most teachers master the use of information technology well, and the process of delivering material to students is carried out patiently and attentively. The smooth online learning process can also be followed by other levels of education, including practical learning in the field of Mechanical Engineering at vocational schools, which is difficult to carry out online. Therefore, teachers must continue to look for ways so that students get appropriate material, even if it is not through direct practicum due to limited tools that are not available at home. It's important to remember that the learning process involves interactive activities between teachers and students and reciprocal communication within educational settings to achieve learning objectives (Rustaman, 2001).

Several studies have revealed the existence of obstacles and difficulties in online learning during the pandemic. The results of the research show that obstacles that will affect the success of online learning include a lack of teachers interacting, delivery of material that is less understandable to students, parents' unpreparedness to guide their children in learning, and parents' ability to finance more spending on the internet as a learning tool (Handayani et al., 2020). From the student side, there are still many obstacles because almost all students use cell phones for online learning, so accessing media and videos and completing assignments or assessments becomes difficult in real-time. LMS access, if done with a cell phone, will cause internet data quota usage to run out quickly, causing learning to not be able to run according to students' study time demands.

The results of previous research are in line with the results of the research above but also look at obstacles from the students' and parents' side (Sofianto & Zuhri, 2021). Of a total of 84 schools, 54.12% of school principals stated that the infrastructure provided to teachers was adequate. In agreement with school principals, 42.96% of teachers stated that the infrastructure owned by teachers for online learning was sufficient. As for parents' opinions, 1,383 people (33.54%) stated their facilities and infrastructure were inadequate, and 145 people (3.52%) stated they were very inadequate. From the student side, as many as 3,222 students (32.07%) viewed teacher infrastructure as inadequate, and 499 students (4.97%) stated that teacher infrastructure was very inadequate. The results of this research align with research that has been carried out (see Figure 3).

Judging from the platform used, WhatsApp social media is used by most productive teachers in the field of Mechanical Engineering at online learning vocational schools. The reason is that this application has several advantages: it is easy to use and can send photos, videos, or links. Teachers consider using WhatsApp simpler. WhatsApp is a social media familiar to the public and has been used for daily communication so that almost all students can access it via their mobile phones. This finding further confirms that WhatsApp's ease of operation makes its use in online learning very high. This phenomenon implies that WhatsApp, the main platform for learning and using applications such as YouTube, email, Google Meet, Zoom and Google Forms, is an additional platform to support learning via WhatsApp. The results of this research are in line with the research (Assidiqi & Sumarni, 2020) which states that there are four digital platforms that can support online learning, namely WhatsApp groups, Google facilities (Google Classroom, Google Form, Google Meet), and Zoom Cloud Meeting. If these additional applications are not clearly regulated, their implementation will make it difficult for teachers and students to monitor the implementation of learning because there is a possibility that discussions, assignments, and homework will not be collected in one archive that can be accessed at any time. Another difficulty is that the learning evaluation process, especially the implementation of the learning process, cannot be monitored so that the achievement of the competencies obtained by students cannot be mapped clearly.

Other platforms that are also widely used in vocational school learning are Google Meet and Zoom. This video conferencing platform is used in conjunction with other digital platforms such as WhatsApp and LMS. It turns out that the use of video conferencing applications is quite widely used and really helps vocational-school teachers in implementing online learning. Using these two platforms makes it easier for teachers and students to convey learning information and makes it easier for students to ask questions about material that is difficult to understand. The Zoom platform can be used to discuss with students (Greenhow & Lewin, 2016). The use of social media combined with video conferencing applications is sufficient to overcome the shortcomings that arise, especially those related to difficulties in understanding learning material, because social media can create a digital culture (Wagiran et al., 2020). However, this combination has not been able to assist teachers in carrying out administration and monitoring student learning activities. Such learning only makes teaching easier for teachers but does not accommodate how students learn.

Learning via the Google Meet and Zoom platforms allows teachers and students to discuss questions and answers through virtual face-to-face meetings. This finding is interesting to discuss. Teachers use Google Meet more than Zoom Meeting because the duration of the unpaid application is longer. Google Meet can be accessed for free and provides unlimited meeting duration. Meanwhile, the Zoom application also provides a free account, but the meeting duration is limited to 40 minutes; if the duration exceeds, the meeting will stop automatically, so the user must create a new meeting room (Parasian & Yuliati, 2020). Users must purchase a paid account if they want a meeting duration of more than 40 minutes for Zoom.

The use of LMS for online learning is relatively low compared to the use of WhatsApp, Google Meet and Zoom applications. Teachers consider LMS complicated compared to other platforms, so it requires adequate digital literacy and greater effort to learn it. LMS generally performs three general functions, which include presenting and systematize training content, creating tasks to test and consolidate knowledge, evaluating progress (Rietsema, 2024).

Therefore, online learning that can accommodate learning such as onsite classes is learning that is carried out using LMS such as Blackboard, Edmodo, Moodle, Google Classroom, and Microsoft Team. An LMS is software that manages e-learning by automating the administration, tracking, and reporting of training or educational activities (Ellis, 2009; Rusli et al., 2017). LMS can be integrated or linked with video conferencing applications such as Zoom, Big Blue Button, or Google Meet. Currently, e-learning plays an important role in education as a very useful learning approach (Squillante et al., 2014).

Since the Covid-19 pandemic, e-learning has increasingly played an important role in learning. If e-learning was still a discourse in the past, now e-learning has become a major need. The role of an adaptive teacher is very necessary in using LMS to carry out online learning. Basically, the internet is set to revolutionize the way people communicate and engage with each other and education providers (teachers) are required to be able to adapt to the new online world in the world of education (Turnbull et al., 2022). In fact, e-learning has successfully integrated classroom-based learning with online technology and blended learning. Data collected by Blackboard shows that the use of virtual classrooms has increased very rapidly, up to 9000% every year (Alharbi & Khalil, 2022). Similarly to distance learning, e-learning is characterized by significant aspects such as accessibility to educational services, resources, materials, and flexibility in both space and time (Rahayu & Wirza, 2020; Sayem et al., 2017). Therefore, e-learning has proven very beneficial during the pandemic, as all face-to-face learning has stopped.

From the student side, e-learning platforms provide personalized learning experiences and increase motivation (Northey et al., 2015). E-learning platforms provide very flexible convenience and freedom to users (Halawi & Mc Carthy, 2008). It was also found that students recognize the significance of the educational process in academic settings, and they actively engage in assignments, studying, discussions, and homework with enthusiasm (Uziak et al., 2018). Students' motivation and willingness are built because of innovation and flexible delivery of information (Rawashdeh et al., 2021). E-learning appears to be the most appropriate learning method, effectively managing students' time and conserving resources in the educational process.

Blackboard and Google Classroom are Learning Management Systems (LMS) suitable for e-learning and have been used by most educational institutions worldwide during the Covid-19 pandemic. However, this case study shows that LMS usage is quite low. These results imply that vocational school teachers are not ready to learn online using LMS. Following the basic concept of online learning and face-to-face learning, which contains planning, implementation and assessment, teachers cannot complete this cycle because they only rely on social media applications and video conferencing during online learning. The solution to the problem above is that vocational school teachers need to be equipped with the skills and knowledge of using LMS for the learning process so that learning can be carried out asynchronously (with LMS) combined with synchronous learning (with social media and video conferencing).

This research reveals that teachers often use WhatsApp social media to carry out learning. This platform is indeed an application that is very familiar to teachers and students because it is easy to use in the learning process. In the WhatsApp group, teachers can provide material in the form of images, videos, files, or links to students. Through WhatsApp groups, teachers and students can discuss directly virtually. The weakness of this learning application is that it does not provide direct material delivery and cannot document the implementation of learning in a structured manner. Teachers have employed the WhatsApp application as a tool for online learning, leveraging various features like photos, videos, documents, and video calls to support educational activities (Okvireslian, 2021). Several challenges arise in using WhatsApp as a learning medium, including signal interference, limited smartphone memory, and difficulties understanding the provided material. For example, it has been reported that this application has several weaknesses when used for learning, namely that teachers cannot monitor students' seriousness during the learning process, and phone memory fills up quickly (Maghfira, 2021). However, the use of the digital social media platform WhatsApp is highly accepted by most students at universities in Indonesia (Mulyono et al., 2021).

Learning is the interaction between teachers and students with learning resources in a particular learning environment. Online learning requires teachers to apply learning methods that

allow students to interact with learning resources (accessing material, doing assignments, and taking tests) in a comfortable learning environment. The online learning environment is expected to facilitate implementing student-centred learning (SCL) rather than teacher-centred learning (TCL). Although learning activities can't be TCL only, because usually a combination of TCL and SCL is highly recommended for online learning. Teacher-student double-centred learning style (TSDCLS) and student-centred learning style (SCLS), both of which have a good influence on the formation of student competencies (Dong et al., 2019). Changes in the teacher's role from being teacher-centered to being student-centered Indeed, it cannot be done quickly; therefore, some teachers have difficulty understanding the teacher's role in SCL (Keiler, 2018). SCL is currently understood as implementing learning activities, teaching relevant skills, and motivating students (student-centred learning is understood as). creating engaging activities, teaching relevant skills, and having motivated students (Trinidad, 2020).

CONCLUSION

Most vocational-school teachers in the field of mechanical engineering stated that they were not ready to implement e-learning. The readiness of productive teachers is lower than that of adaptive teachers. Learning for adaptive courses is theoretical and conceptual, making it easier to carry online. Meanwhile, learning for productive courses requires hands-on practice to form technical skills. This is the main challenge in practical learning carried out online. Difficulties related to implementing this learning process are the reason for the low readiness of productive teachers. Another difficulty experienced by teachers in e-learning is the aspect of learning facilities related to limited internet connections and hardware. Learning innovations are needed to accommodate these obstacles and become a middle ground. The digital platform that is most dominantly used in online learning is WhatsApp, even though it is basically not intended for the learning process. The use of Google Meet and Zoom Meeting video conferencing is in second place. The least used platform is LMS, even though LMS is a platform specifically designed for learning and offers advantages in managing the learning process. The results of this survey provide an overview of the conditions for implementing online learning which can be used as a basis for exploring the factors causing teachers' unpreparedness to use LMS. Teachers use student-centred learning (SCL) and teacher-centred learning (TCL). The SCL percentage needs to be increased and the TCL percentage further reduced to motivate students.

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