STRATEGIC ANALYSIS OF TOOLS/MEDIA COMBINATION FOR DISTANCE LEARNING IN SCIENCE COURSES

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ABSTRACT

Negative responses to the learning process and the high cost of buying quotas are problems that arise due to the implementation of online learning during PJJ. The purpose of this research is to analyze strategies for using a combination of distance learning tools/media that are effective and low-cost in the teaching-learning process in science courses. This survey research uses a closed questionnaire as a research instrument. Questionnaires were distributed to 112 PGSD students. The questions asked were 10 items related to network and internet access, and the PJJ tools used. The data obtained were analyzed using descriptive statistics. We found the fact that the University of Mataram has provided good e-learning for use in online learning. The vicon media and social media that are most frequently used sequentially are Google Meet (96.4%) and WA (99.1%). Therefore, the online tool/media that we recommend is the use of a combination of the three tools/media together with the surrounding environment as a Natural Laboratory in science learning. This recommendation is not only relatively cheaper in cost, but also has the potential to develop aspects of students' knowledge, attitudes and science process skills.

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1. INTRODUCTION

The COVID-19 pandemic has had an impact on various fields in Indonesia including education. Various universities adopted or adapted policies to change face-to-face teaching methods in class to distance learning as an effort to prevent the spread of the pandemic. In the context of higher education, distance learning itself is a learning process that allows lecturers and students to be in different locations (Widyaningrum et al., 2020). In Indonesia, the distance learning policy is known as "Learning from Home" referring to the circular letter of the Ministry of Education and Culture of the Republic of Indonesia Number 701/LL7/AK/2020. At the University of Mataram, the implementation of distance learning refers to the circular letter of the Chancellor of the University of Mataram Number 4945/UN18.1/TU/2020 Concerning the Implementation of Academic Activities Online to Prevent the Widespread Spread of the COVID-19 Outbreak at the University of Mataram. This applies to all Study Programs including Elementary School Teacher Education.

The policy of implementing distance learning creates problems in the Elementary Education Study Program. The results of the evaluation of its implementation show that student perceptions tend to be negative. This is due to limited costs to buy quotas and an unstable internet connection (Widodo, Nursaptini, Novitasari,

Sutisna, & Umar, 2020). The survey results also show that most students hope to be able to return to face-to-face learning on campus. In addition, students also feel that there is a reduction in positive interactions with lecturers and students during video conferencing, and students are more comfortable learning face to face directly (Rahmatih & Fauzi, 2020). In fact, student readiness is quite good in terms of the aspects of facilities and infrastructure owned, skills in using various platforms and mitigation of potential obstacles (Sriwarthini, Syazali, & Sutisna, 2020). The facts related to these conditions indicate that the distance learning tools and strategies that have been implemented so far require innovation. This is expected to minimize various problems or obstacles that arise as a result of the distance learning process.

Problems or obstacles related to the selection of tools for distance learning and their implementation strategies have attracted the attention of researchers in Indonesia. For example, the use of Edmodo by Febrianti in 2017 (Widyahastuti, Fransiskus, & Tjhin, 2017). The findings from this study are that students tend to be passive or less active. The contributing factors are (1) limited internet access and (2) low motivation to study remotely. Low motivation can be caused by the absence of student-student and student-teacher interaction during face-to-face learning using video converence (Burdina, Krapotkina, & Nasyrova, 2019). Even though distance learning has good quality when this interaction occurs (Wang, Minku, & Yao, 2018). Empirical evidence is also reported by Titan where distance learning with active participation gives better results (Ferdianto, Faniru Pakuning Desak, & Lena, 2018). However, the BBB menu for video conferencing services at SPADA Unram which is free for students and lecturers at the University of Mataram is difficult to access. So the solution that can be offered to this problem is the use of a combination of tools.

The combination of tools in the framework of the distance learning process that has been recommended is the use of Google Classroom, Whatsapp and Zoom (Utomo, Sudaryanto, & Saddhono, 2020). Google Classroom functions as an assignment tool, quizzes and exams. Whatsapp is for discussion forums via messages, while zoom is a substitute for face-to-face meetings via video conferencing. Although this recommendation was formulated based on the results of a survey of students in Indonesia, its effectiveness has not been tested empirically, especially in science learning. In addition, the University of Mataram also has a complete e-learning system to support distance learning but has not been involved in this recommendation. The implementation of Mataram University e-learning together with Google Meeting and Whatsapp has proven to have a positive impact on science learning outcomes for PGSD Study Program students (Syazali, Wira, & Amrullah, 2021). However, the implementation of a combination of these tools is not effective for training science process skills (Syazali, Rahmatih, & Nursaptini, 2021).

Some of the research results that have been described previously indicate that distance learning can be done using various tools or a combination thereof (Ferdianto et al., 2018). Distance learning can be carried out by fulfilling five criteria, namely face-to-face via video conference, discussion forums, assignments and exams (quize, UTS and UAS). However, learning in the Elementary Education Study Program needs to pay attention to internet connection problems and costs to buy quotas, as well as the lack of interaction during learning (Rahmatih & Fauzi, 2020; Widodo, A., Nursaptini, Novitasari, Sutisna, & Umar, 2020). In addition, learning science also requires facilities that can train students' science process skills (Darmaji Darmaji, Kurniawan, Suryani, & Lestari, 2018; Duda, Herawati Susilo, & Newcombe, 2019; Malau, Motlan, Sirait, & Lubis, 2019), which in the implementation of distance learning so far has been difficult. So that the combination of tools used must be complete. At the implementation level, this combination of tools must be easily used in the PGSD Study Program and at an affordable cost (Valyavsky, Ivanov, & Uchevatkina, 2020). So that the application of distance learning in the future can develop all aspects of both product, attitude and science process skills of students.

The purpose of this research is to analyze strategies for using a combination of distance learning tools/media that are effective and low-cost in the teaching-learning process in science courses. The results of this research itself can be used to determine the most appropriate combination of platforms for science learning during the implementation of distance learning. In addition, theoretically the results of this study are also useful for: (1) adding to the repertoire of knowledge related to the combination of distance learning tools/media used in science courses, (2) providing additional information related to the combination of distance learning tools/media used in science courses, and (3) can be used as additional references for further research. Another important benefit is that lecturers can use the results of this research as a basis for designing lecture plans that are more effective and efficient and have relatively lower costs in implementing distance learning.

2. RESEARCH METHOD

This research is a type of descriptive research that uses a quantitative approach. The research consisted of three stages, namely adaptation of survey instruments, data collection process and analysis of survey results. The output to be achieved from these stages is a recommendation for a relatively low-cost implementation strategy tool for implementing distance learning in science courses. This research itself was carried out for second year students (semester 5) of the 2021/2022 Academic Year. These students were chosen as research subjects because they were facilitated by distance learning since studying at the PGSD FKIP Study Program, Mataram University.

The instrument used in this study was a closed questionnaire distributed via the Google form link. This questionnaire was adapted from an instrument developed by Utomo, M. N. Y. et al. (2020). There are a total of 10 questions from two groups, namely (1) related to network and internet access, and (2) distance learning tools. The adaptation made was by adding several question items related to science learning. The adapted instrument was validated by an expert validator. Then the input from the expert validator is used as a basis for modifying and perfecting the instrument that will be used as a data collection tool.

Data was collected from a sample determined by simple random sampling. The minimum number of samples is determined using the Slovin equation. The google form link that leads to the questions in the questionnaire will be shared via the WhatsApp Group of each class. The data is then analyzed qualitatively and quantitatively. Qualitative analysis is used to map the types of tools or combinations of tools used during the implementation of distance learning. The quantitative analysis was carried out using descriptive statistics in the form of proportions. Data analysis results are then visualized in the form of a bar chart using Ms. Excel.

3. RESULT AND DISCUSSION

Based on the survey results of student responses to the variety of online tools used and costs incurred during PJJ, we recommend using 3 combinations of online learning tools and the environment around students as natural laboratories (Figure 1) a combination of these tools is e-learning Unram, WA and Google Meet. Unram e-learning that can be used is SPADA Unram or Daring Unram. The function of this tool in learning is assignments, quizzes and exams, namely UTS and UAS. WA functions as an online discussion forum media and conveys lecture information through the chat menu. Meanwhile, Google Meet is used for face-to-face learning online through vicon.
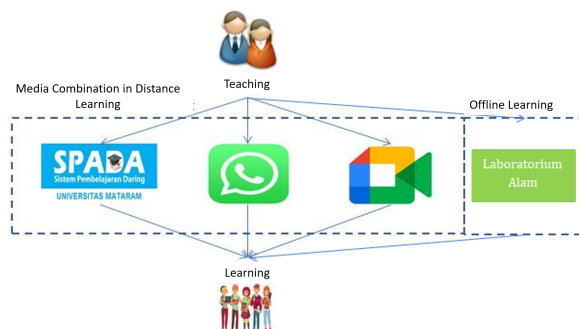

Figure 1. Recommendations for a combination of media in implementing Distance Learning

The combination of media we recommend is different from the recommendations from Utomo, M. N. Y. et al. (2020), Google Classroom was replaced with Unram e-learning because the survey results showed that the LMS-based media was of good quality (Figure 2). On the other hand, LMS-based online media has advantages. Some of them are automation and administrative centralization of online learning activities such as registration, delivery of learning materials to tracking and reporting student learning progress (Ferdianto et al., 2018). Some of these advantages lead to positive student responses to online learning (Yildiz, Tezer, & Uzunboylu, 2018). In the aspect of the learning process, the use of implementation in distance learning can increase learning independence and active participation (Brian Chen, Kathy Huang, Gribbins, & Swan, 2018). In the aspect of science learning outcomes, the use of Moodle-based LMS is empirically proven to be able to develop student creativity. This is because LMS allows lecturers to manage learning and exchange information

with students quickly and flexibly (Gunawan, Sahidu, Susilawati, Harjono, & Herayanti, 2019). In addition, the use of LMS as an online learning medium also has a positive impact on student involvement in learning, information literacy and academic performance (Avcı & Ergün, 2022).
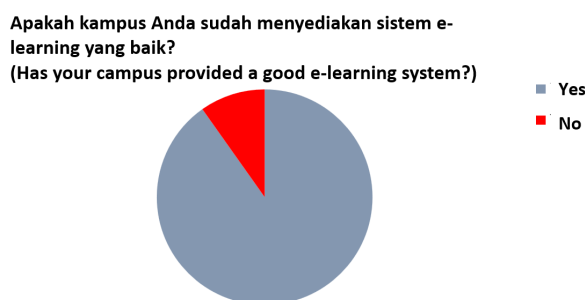
Apakah kampus Anda sudah menyediakan sistem e-learning yang baik?
(Has your campus provided a good e-learning system?)

■ Yes
■ No

Figure 2. Student respons about the quality of e-learning portal

Another difference is that Zoom was changed to Google Meet. This refers to survey results in which 96.4% of students stated that the tool for vicon commonly used by lecturers was Google Meet (Figure 3). On the other hand, the use of Google Meet as an online learning medium has a positive impact. Some of these positive impacts include: (1) the best vicon application, students are satisfied with class management and the process can be recorded and increases interest in learning because it is easy to use, time is flexible and can be accessed anywhere, as long as there is internet access (Minhas, Hussain, Ghani, Sajid, & Pakistan, 2021; Septantiningtyas et al., 2021), and (2) effective and learning runs smoothly during the implementation of PJJ, lecturers and students can more easily interact during learning (Guntur Gunawan, Kristiawan, Risdianto, & Monicha, 2021; Nasution, Nandiyanto, & Department, 2021). The reason for choosing WA is because it is used most often compared to other social media (Figure 3b).
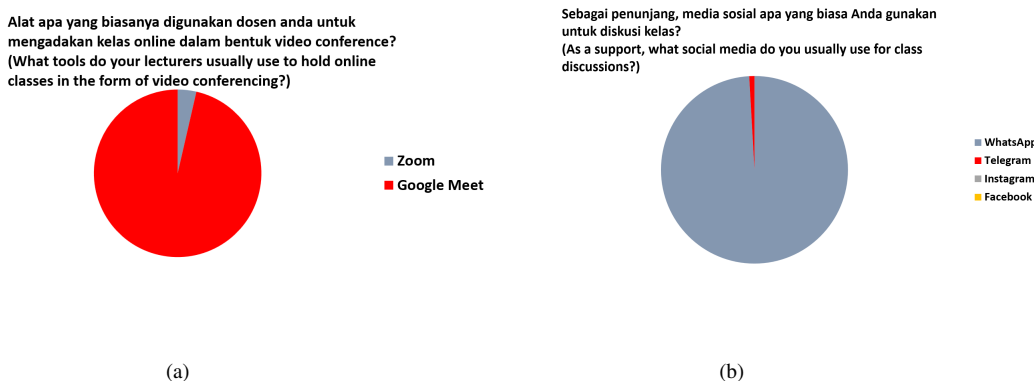
Alat apa yang biasanya digunakan dosen anda untuk mengadakan kelas online dalam bentuk video conference?
(What tools do your lecturers usually use to hold online classes in the form of video conferencing?)

■ Zoom
■ Google Meet

Sebagai penunjang, media sosial apa yang biasa Anda gunakan untuk diskusi kelas?
(As a support, what social media do you usually use for class discussions?)

■ WhatsApp
■ Telegram
■ Instagram
■ Facebook

(a)   (b)

Figure 3. Student responses to:
(a) the vicon tool used by lecturers and , (b) social media which is commonly used for online discussions

The combination of media that we recommend is also different from the recommendations from Syazali & Ilhamdi (2022). In this strategy recommendation, we add learning by utilizing the environment around students as a Natural Laboratory. This of course will save internet costs because it is implemented offline. In addition, the implementation of the Natural Laboratory in learning can also develop students' science process skills (Syazali, Widiada, & Zain, 2022), which has been difficult to do due to the low weight of science courses (Tim Penyusun, 2020), so that learning is focused on mastering aspects of the product. This also reduces barriers to online learning such as a stable network/internet connection that is unevenly distributed, insufficient internet quota, lack of ICT literacy for some lecturers and students, and boredom in online learn-

ing (Indrawati, 2020). In the results of this survey, only a small proportion of students have a fast internet connection (Figure 4). This of course can reduce the quality of the process and results of learning science.
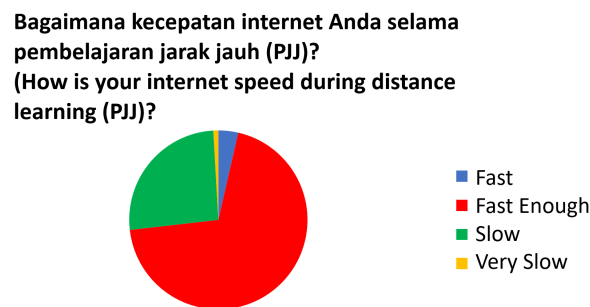
Bagaimana kecepatan internet Anda selama pembelajaran jarak jauh (PJJ)?
(How is your internet speed during distance learning (PJJ)?

- ■ Fast
- ■ Fast Enough
- ■ Slow
- ■ Very Slow

Figure 4. Student response to the aspect of internet connection speed

The difference in internet speed is caused by the uneven distribution of infrastructure in each region. PGSD FKIP Unram students come from different regions, mainly from NTB but are scattered in different districts/cities. Some came from West Lombok district, Mataram city, Central Lombok to Bima district which is the easternmost area of NTB province. Another factor is due to differences in providers used by students. Even though there is a free package/quota/free wifi policy (Figure 5a), most students use quota (cellular data) compared to special internet such as wifi (Figure 5b).

Apakah ada kebijakan (paket gratis/kuota/WIFI gratis) untuk mendukung pembelajaran jarak jauh?
(Is there a policy (free package/quota/free WIFI) to support distance learning?)

- ■ Yes
- ■ No

Apa tipe provider internet yang Anda gunakan?
(What type of internet provider do you use?)

25%

75%

- ■ Particular Internet (WiFi)
- ■ Internet Quota

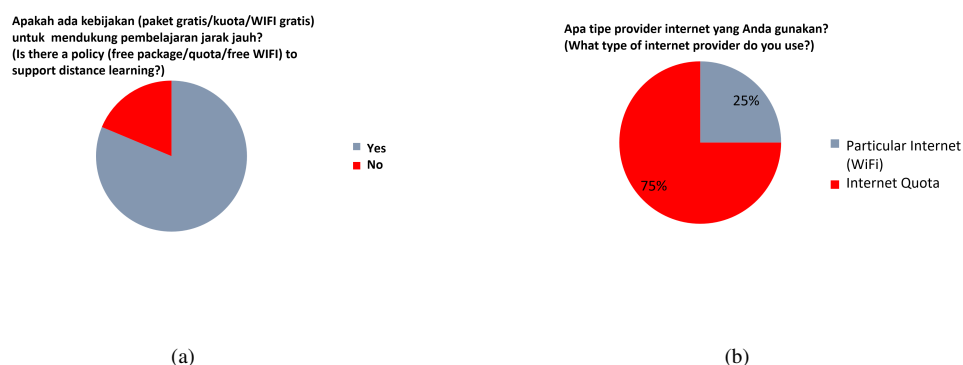(a)   (b)

Figure 5. Student responses to aspects of:
(a) PJJ policies, and (b) types of providers

The strategy for using the combination of tools/media that we recommend is not only considering the effectiveness aspect, but also the lower cost aspect. In its implementation, it is recommended to minimize the use of Google Meet as a media vicon in conveying theory. For practicum activities, take advantage of the environment around students as a Natural Laboratory. This recommendation is based on the results of research which found that 90.2% of PGSD FKIP Unram students stated that the costs incurred for implementing PJJ were relatively expensive. This can cause many students to stop taking distance learning. The one that consumes the most internet quota is vicon so that its use must be reduced, except for things that are important and cannot be done without a vicon.

4. CONCLUSION

The results of a survey of 112 PGSD Study Program students at the University of Mataram showed that the most frequently used media vicon for face-to-face learning online was Google Meet. The most frequently

used social media is the WA application. Based on this fact, we recommend a combination of the two media to be used together with UNRAM e-learning and the surrounding environment as a Natural Laboratory in science learning. In Merdeka Belajar curriculum, these recommendations can be implemented in Elementary Science Education courses (3 credits) and Basic Sciences.

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