JUDUL ARTIKEL: Effectiveness of online learning in non-online classes during the pandemic

PENULIS: Jimmy Gozaly; Yulianti Talar; Christina Wirawan, Axel Varian Kurniawan

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EFFECTIVENESS OF ONLINE LEARNING IN NON-ONLINE CLASSES DURING THE PANDEMIC

Abstract

The COVID-19 pandemic that has been going on since the beginning of 2020 has forced governments to take a policy to implement online learning. This policy is an effort to break the chain of virus spread in education clusters. For schools and universities that are not used to carrying out online learning, this condition is a problem. Therefore, measurement is needed to ensure effectiveness. In this study, the effectiveness was measured using the variables specified in the Indonesian Online Learning System (SPADA) 2019 set by the Indonesian government. Data collection was carried out by quantitative and qualitative methods. Quantitative analysis was carried out through questionnaires administered to students while qualitative was carried out by interviewing students and lecturers. The data was processed using cross-tabulation analysis and multiple linear regression. Analysis of Strengths, Weaknesses, Opportunities, and Challenges was carried out to assess online learning. As research results, it is found that online learning is quite effective, but there are still many things that can be improved to increase the effectiveness of online learning.

Keywords: *COVID-19, effectiveness, online learning, SWOC, university*

1. Introduction

Coronavirus disease 2019 (COVID-19) is a problem that is currently being faced by almost all countries in the world. With the severity of the consequences caused by COVID-19, the governments of countries have taken actions, such as imposing large-scale social restrictions and lockdowns.

Indonesia is a country in Southeast Asia, which has also been affected by the COVID-19 pandemic. As in other countries, the patient and death toll from COVID-19 in Indonesia is quite high. Therefore, the Indonesian government has also taken large-scale social distancing. In the education sector, schools and universities were forbidden to hold face-to-face meetings. Learning and all activities are shifted to online activities. Especially for universities, the online learning process is strengthened by the Circular of the Director-General of Higher Education (Ministry of Higher Education of the Republic of Indonesia, 2020). This decision was unexpected and presented challenges for classes that had been doing face-to-face learning (non-online learning) before the pandemic. Online learning is unfamiliar to mostly both lecturers and students.

When this research was conducted, distance learning had entered its fourth semester. Lecturers and students are more familiar already with online learning methods, and better learning facilities are available, including a socialized and developed learning management

system (LMS). However, because the class originally uses non-online learning methods, this change may cause learning to be less effective.

X University's Industrial Engineering Study Program is one of the study programs that initially use non-online learning methods. This study program's learning method suddenly needs to change to online learning. So that, with all the restrictions and difficulties, there is a need to study how effective online learning is. With that condition, this study program was used as a case in this research.

Various studies have been carried out on the effectiveness of online learning, both for classes that are indeed conducted online (such as Buttner & Black, 2014; Means, Toyama, Murphy, & Baki, 2013), as well as classes that were originally non-online but were forced to go online (Agarwal & Dewan, 2020; Baber, 2022; Satyawan, Wahjoedi, & Swadesi, 2021; Suprianto, Arhas, Mahmuddin, & Siagian, 2020). Research has also been carried out to identify barriers to the effectiveness of online learning, (such as Heng & Sol, 2021; Ramli, Majid, & Badyalina, 2020) and the positive outcomes resulting from online learning (Lorenzetti, 2013; Nguyen, 2015). Some studies compare online learning with non-online learning methods (such as Chang, Wang, Lin, Cheng, & Chiang, 2021; Darkwa & Antwi, 2021). Moreover, research is also conducted on the effectiveness of the LMS (such as Gunawan, Hui, Ma'sum, & Sukawati, 2020; Singh, Sharma, & Paliwal, 2020; Zulfikar et al., 2019).

Even though there have been numerous studies on online learning, research on the effectiveness of online learning for initially non-online classes is still scarce. There was also no research on the effectiveness of online learning based on five aspects of the government-mandated Indonesian Online Learning System found. This study is useful for assessing the effectiveness of online learning and determining what can be done to improve it.

2. Literature Review

Online learning has been quite popular since the 2000s. Many universities and colleges have opened distance learning classes. Several researchers have proven that online learning classes opened are effectively conducted learning processes (Buttner & Black, 2014; Means et al., 2013; Nguyen, 2015). Some researchers have found the positive things obtained from online learning, namely cost-effective implementation, ease to form world-class (Lorenzetti, 2013), enhances better students' test scores and access to learning materials, improves learning perceptions, reduces failures, and improved relations between students (Nguyen, 2015).

However, institutions in Indonesia were obliged to switch from face-to-face study to online learning almost immediately. This occurred unexpectedly, and no plans for online

learning had been established. Considering the implementation of online learning which is very different from face-to-face learning, there are concerns about the effectiveness of online learning.

Research has been carried out before by several researchers and it is found that online learning is effective (Agarwal & Dewan, 2020; Baber, 2022; Satyawan et al., 2021; Suprianto et al., 2020). On the contrary, some researchers identify obstacles or difficulties related to online learning, namely digital skills, socio-economic factors, assessment and supervision, workload, and course compatibility (Heng & Sol, 2021). Other researchers find that online learning is boring, unengaging, needs personal attention, lack practical experience (Dhawan, 2020), and causes stress for students (Argaheni, 2020). However, no article was found using the five aspects of the Indonesian Online Learning System or called SPADA.

"SPADA is a program of the Directorate General of Learning and Student Affairs of the Ministry of Research, Technology and Higher Education to increase equitable access to quality learning in Higher Education" (Sekretariat Direktorat Jenderal Pendidikan Tinggi Kementrian Pendidikan dan Kebudayaan, 2015). SPADA was designed to support Merdeka Belajar Kampus Merdeka (MBKM) or Independent Learning Independent Campus initiative sets by the Indonesian government. This MBKM encourages students to learn outside of the classroom, whether on the campuses of other institutions, corporations, or even in the community. SPADA highlights the existence of five aspects of online learning, namely learning design, learning activities, delivery techniques, learning media, and technology, as well as guidelines for applying online learning support services.

3. Methodology

As described earlier, the assessment of online learning in the study program performance is carried out based on 5 aspects of SPADA online learning. The five aspects of online learning performance consist of:

- Lesson plan
- Learning Activities
- Delivery/delivery strategy
- Learning media and technology
- Study assistance services

These five aspects are deployed to 28 variables, as can be seen in Table 1. These variables are compiled into a questionnaire. The assessment of the effectiveness of online learning is carried out with four variables as shown in Table 2.

Table 1. Online learning performance

Var. No.	Variable statements	Score
X1	Online learning materials are oriented towards student independence	3.19
X2	Online learning materials emphasize student creativity and innovation in learning	3
X3	Online learning materials are arranged systematically	3.01
X4	Online learning materials are in accordance with the predetermined learning plan	3.08
X5	Online learning is carried out according to a predetermined schedule	3.25
X6	It is easy to collect assignments/reports online	3.12
X7	Online group work can be done easily	2.31
X8	Presentation of assignments online is easy	2.91
X9	The online exam process can be done easily	2.89
X10	The process of monitoring and evaluating online learning can guarantee the quality of learning	2.64
X11	The online learning plan for one semester is clearly conveyed at the beginning of the lecture	3
X12	Online learning materials are presented in an interesting way	2.75
X13	Online learning materials are delivered clearly	2.89
X14	The interaction between lecturers and students in online learning takes place actively	2.81
X15	Delivery of online learning materials (lectures/practicum) facilitates students to learn actively (practice questions, case studies, discussions)	2.99
X16	Lecturer / Assistant has an adequate level of technology and media mastery	3.12
X17	Lecturers always accompany during online learning	3.03
X18	Feedback from lecturers in online learning can be used by students to better understand the lecture material	2.99
X19	Online learning provides an opportunity to reflect on material understanding through self-assessment	2.95
X20	The characteristics of the material delivered are in accordance with the online learning media used	3.04
X21	Easy-to-use online learning platform	2.93
X22	Online learning media (Whatsapp, Line, Google Meet, Zoom, etc.) can be used easily	3.29
X23	Online learning materials can be downloaded easily	3.24
X24	Administration provides administrative service support during online learning	3.08
X25	Lecturers provide support in overcoming difficulties in online learning	3
X26	Information about student learning progress and success can be accessed easily in online learning	3
X27	Study Program provides a means of submitting input/complaints for students related to online learning	2.97
X28	Internet quota is always available when participating in online learning	2,83
Average		**2.93**

Data collection was carried out by administering questionnaires using Google Forms to Industrial Engineering students Class of 2017-2020. The questionnaire contains questions regarding student profiles, assessment of online learning performance, and effectiveness. The rating scale used is the Likert scale as shown in Table 3.

Table 2. Online learning performance effectiveness

Var. No.	Variable statements	Score
Y1	Online learning improves my understanding of course material	2,52
Y2	Online learning increases my motivation to study	2,43
Y3	Online learning increases my independence in learning	2,99
Y4	Pembelajaran daring meningkatkan kesempatan saya untuk berpartisipasi secara aktif dalam kegiatan belajar (Y4)	2,72
	Average	**2.66**

Tabel 3. Likert Scale

Score weight	4	3	2	1
Performance Rate	Strongly Agree	Agree	Disagree	Strongly Disagree
Effectivity	Strongly Agree	Agree	Disagree	Strongly Disagree

Based on this measurement, online learning effectivity and performance measurement were investigated using multiple linear regression. Then, based on multiple linear regression results and cross-tabulation analysis of the respondents' profiles, SWOC analysis was conducted. Based on SWOC analysis then improvement suggestions were established. The research was carried out according to the flow diagram in Figure 1.
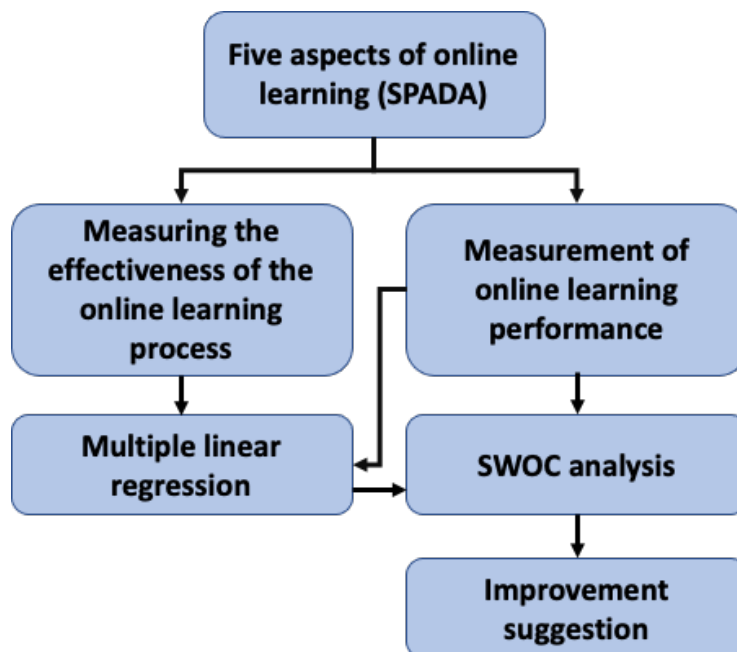

Figure 1. Research flow

Measurement of the level of online learning performance is carried out using the following formula:

$$\bar{X} = \frac{\sum_{i=1}^{k} X_i}{n} \qquad (1)$$

where:

$\bar{X}$ = average score of performance level

X_i = the score of ith respondent's performance level

n = number of respondent

To find out the online learning performance variables that affect its effectiveness, the multiple linear regression method is used with the following equation:

$$Y = a + b_1 X_1 + b_2 X_2 \dots + b_n X_n \qquad (2)$$

where:

Y = online learning process effectivity

$X_1, X_2, \dots, X_n$ = online learning performance variabels

a = constant

$b_1, b_2, \dots, b_n$ = regression coefficient

SWOC analysis can be used to analyze strengths, weaknesses, opportunities, and challenges (Dhawan, 2020). To do SWOC analysis, interviews were conducted with students and lecturers. Based on all information gathered, improvement suggestions were built.

4. Result and Discussion

The results of the questionnaires filled out by respondents, namely students of the Industrial Engineering Study Program can be seen in Table 1 and Table 2.

4.1 Validity and Reliability Test

The validity test has performed to confirm the accuracy of the measuring instrument. The all construct score was positively associated with the complete score of the questions (count r value > r table value), hence it was valid. Using the Cronbach Alpha (α) statistical test, reliability testing was performed to assess the consistency of the measuring device. The learning process performance evaluation questionnaire score is 0.915, while the learning effectiveness assessment questionnaire score is 0.845, indicating that both questionnaires are reliable.

4.2 Cross Tabulation Analysis (Crosstab)

The questionnaire was filled out by 75 2017-2019 class students, with the profiles as shown in Figure 2. There is no relationship between the class and the effectiveness of online learning as a χ^2 probability value of $0.809 > 0.05$.
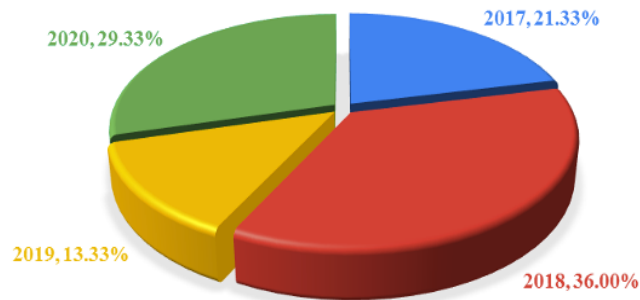
Figure 2. Class Pie Chart

The proportion of the GPA of students who fill out the questionnaire is shown in Figure 3. Crosstab analysis was performed between this data and the effectiveness of online learning, which yielded the χ^2 probability value of $0.451 > 0.05$. That means that there is no correlation between them.
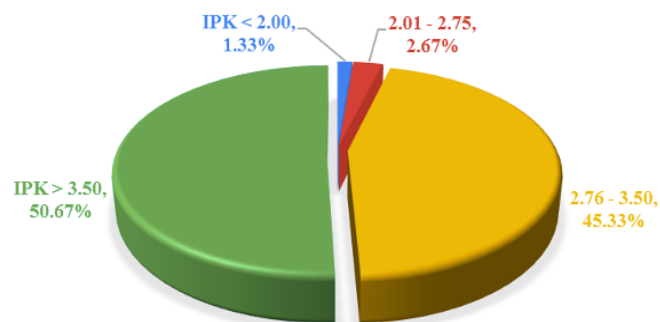
Figure 3. GPA (IPK) Pie Chart

Figure 4 depicts the online learning media chosen by students. Video conference is the most popular. The χ^2 with the online learning efficacy was $0.485 > 0.05$. This demonstrates that there is no correlation between them.
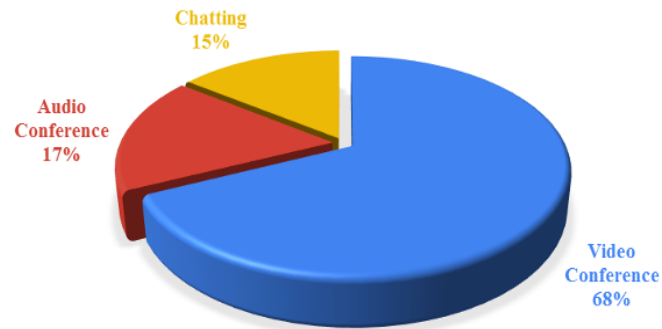
Figure 4. Preferred Media Pie Chart

4.3 Classic Assumption Test

Classical assumption tests are several statistical tests that need to be carried out before performing multiple regression analysis to ensure the validity of the use of multiple linear regression, which consists of:

o The normality test. The significant value Asym. Sig. (2-tailed) of $0.842 > 0.05$, indicating that the data is normally distributed.

o The multicollinearity test. The value of the variance inflation factor (VIF) of all independent variables is less than 10, hence there is no multicollinearity.

o A heteroscedasticity test. From the test results, there are 2 variables (X25 and X5) that have a Sig value. <0.05, which indicates that heteroscedasticity occurs, then the two variables are excluded.

o A linearity test. From the test results, there are 4 variables (X4, X9, X11, X14) that have Deviation from Linearity Sig values. <0.05, which indicates that there are no significant linear correlations, then the four variables are excluded.

4.4 Multiple Linear Regression

Multiple regression analysis was conducted to identify the performance variables of the online learning process that affect learning effectiveness. There are 22 online learning process performance variables used as independent variables, while the dependent variable uses the average of the online learning process effectiveness.

The effect of the independent variables together on the dependent variable is carried out by conducting a simultaneous significant test (F test), with the following hypothesis formulation:

H_0: The regression coefficient is not significant

H_1: The regression coefficient is significant

The level of significance (α) used is 5%.

Decision-making criteria:

Reject H_0 if the significance value is < 0.05

Accept H_0 if the significance value is > 0.05

Based on the processing results, obtained the value of Sig. of 0.000 (<0.05), so the decision to test the simultaneous hypothesis is to reject H_0. This means that the regression coefficient is significant, so the performance of the online learning process has a significant effect on the effectiveness of learning.

The effect of each independent variable on the dependent variable is carried out by performing a partial significant test (T-test) with the following hypothesis formulation:

H_0: the online learning process performance variable does not affect the effectiveness of online learning

H_1: the online learning process performance variable does affect the effectiveness of online learning

Based on the results of processing, the values of Sig X19, X7, and X20 are less than 0.025, then declared to have a significant effect on the dependent variable, with the regression equation:

$$Y = 0.011 + 0{,}388 \, X19 + 0{,}249 \, X7 + 0{,}308 \, X20 \qquad\qquad (3)$$

Information :

Y   = effectiveness of online learning

0.011 = constant

According to the multiple regression analysis results, there are only 3 variables that directly affect the effectiveness and performance of online learning. These three variables can explain the effectiveness and performance of online learning by as much as 50.2% (shown by the adjusted R^2 value). This indicates that 49.8% of the population is still excluded and becoming an excellent opportunity for further research. Multiple correlation values (R) of 0.723

indicate a strong relationship between the dependent variable and the independent variable. These three variables are potential for consideration to improve online learning effectiveness and performance.

4.5 SWOC Analysis

The SWOC analysis was performed to determine the strengths, weaknesses, opportunities, and challenges associated with the present online learning process. The study was based on the value and efficacy of online learning, as well as the findings of multiple linear regression analysis. Classification of value quality is carried out based on the established criteria as shown in Table 4.

Table 4. Quality Criteria

Range	Quality
$1 \leq \text{value} < 1.75$	Very bad
$1.75 \leq \text{value} < 2.5$	Bad
$2.5 \leq \text{value} < 3.25$	Good
$3.25 \leq \text{value} \leq 4$	Very good

4.5.1 Strength

The average score is 2.93 (good). This can be seen as a strength of the study program. However, the overall achievement of the variables is still far from the maximum value, so it is still necessary to improve.

According to the interview results with students and lecturers, regarding the X5 variable, the implementation of online lectures is carried out even more on time than face-to-face lectures. Regarding the X22 variable, initially, students and lecturers were constrained by online media. However, after the second semester, students have found the most convenient and efficient media. Regarding the X23 variable, firstly, the LMS had not been widely socialized and emphasized to be used not mentioned learning materials designed for face-to-face learning. However, in the second semester, lecturers and students were trained to use it. Lecturers were required to create learning materials suitable for online learning and provided them with an LMS that was accessible to students.

Next, 8 variables are assessed with a score above 3, which means that they are already in good scores. These variables are X1, X3, X4, X6, X16, X17, X20, and X24. These variables are considered very good by students because the learning materials have been specifically

designed for online learning, lecturers and assistants have also studied a lot of technology and media related to online learning so that online learning can be carried out properly and smoothly. On the other hand, administrative officers are also prepared to support the online learning implementation.

4.5.2 Weaknesses

Based on student assessments, there is a variable that is considered bad, namely X7. One of the important things for Industrial Engineering graduates is to be able to work in groups. Therefore, many activities are conducted in group work to learn to lead, be led, communicate, relate, make decisions together, resolve conflicts, and others. When learning has to be done fully online, most students feel uncomfortable working in a group. They complain about the high quota fees and limited gadget availability. Besides, the workgroup dynamic is sometimes constrained because the group members sometimes do something else while doing the work. Considering the things above, it is necessary to make improvements to increase the ease and effectiveness of group work.

4.5.3   Opportunity

Starting from the second semester, students and lecturers are familiar with online learning. This discovery opens an opportunity to carry out online or hybrid learning in the future. Some students event can reach better grades during online learning because lecturers are required to prepare learning materials and systematically upload them to the LMS. The students can easily access the material and then discuss it with lecturers.

By proving that online learning is effective also becoming support for universities in Indonesia to conduct MBKM. Using online learning, the MBKM program is supported because:
1. Students can take lessons in far locations.
2. Allow the university to collaborate with other parties, for example, micro, small, and medium enterprises (MSMEs) to be involved in lectures and MSMEs businesses.
3. University can outreach students in remote areas.
4. Cooperation with overseas universities can easily be accommodated.

4.5.4 Challenges

In contrast to the previously described opportunities related to online learning, some challenges need to be faced. The unpreparedness of all parties at the beginning of the pandemic is a challenge.

On the students' side, many students find difficulties with signal, quota, and gadget availability. The next challenge is related to the personal side of the students. Online learning affects the eye health of students because long and continuous use of gadgets. Next, problems occur about motivational problems. The informal learning atmosphere at home makes the learning atmosphere less conducive, causing students to be less optimal in attending lectures. The last challenge from the student side is the stress experienced by students because they cannot gather and interact with friends.

For lecturers, online learning is tough because they must quickly create relevant learning materials, and develop ways to conduct lectures successfully, while also missing out on interaction with students and colleagues. While the challenge for the study program is to design practicums so that they can be done online, rather than in a laboratory with diverse equipment, where students get experience by doing numerous experiments themselves.

Considering the existing opportunities and strengths, and the effectiveness of online learning that has been implemented, online learning can be an alternative learning method in the future. Associated with the weaknesses and challenges that exist, it is necessary to make efforts to overcome them. Several things can be done, including:

1. To carry out group assignments, lecturers need to provide a certain time slot by opening the media for group assignments. Students get clarity of time, and all students participate in this activity. Lecturers can also supervise the implementation.

2. Planning synchronous learning, and assignments in ways that further improve relations between students, for example by holding games, providing time to chat together, and others.

3. Allocate funds to help students who are less well off financially. With online learning, the university's operational costs have decreased. These cost savings should be diverted to help students in need.

4. Create work units that can help lecturers to prepare learning materials, such as making interesting learning videos, interesting presentation slides, and others.

5. The study program is exploring creating a virtual reality laboratory so that students can still get an experience like in a laboratory.

5. Conclusion

Because of the COVID-19 pandemic, online learning has become a necessity. Distress and confusion at the start of the pandemic because of the sudden requirement to conduct online learning can be resolved over time. However, once students, lecturers, study programs, and administrative staff have mastered it, online learning has become a new way for universities to

improve their teaching methods.

The pandemic forcing of online learning is a blessing in disguise because it hastens the adoption of digital technology in education. Government MBKM programs, international learning, and outreach programs can benefit from online learning methods that use digital technology.

As other researchers, we have discovered that online learning is effective. However, there is still room to improve the learning process performance. Study programs can take a variety of approaches to address shortcomings and address current issues, turning them into strengths and opportunities.

Because the variables identified can only explain 50.2% of the variance in learning efficiency, further research can be directed by looking for other variables that affect learning effectiveness. Furthermore, after the online learning system is enhanced and applied, more studies can be done by measuring the effectiveness of learning once more. Other studies can be carried out to look into specific student issues like motivation, health, and stress levels.

Conflict of Interest

The authors declare no conflict of interest

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Thank you for submitting your manuscript to Management in Education.

Sincerely,
Paul Armstrong
Management in Education
mieeditors@gmail.com

3. Hasil review 1 16-9-2022

Fw: Management in Education - Decision on Manuscript ID MIE-22-042

Christina Wirawan <christina.wirawan@eng.maranatha.edu>
Fri 9/16/2022 7:17 AM
To:Yulianti <yulianti@eng.maranatha.edu>;Jimmy Gozaly <jimgozaly@yahoo.com>

📎 1 attachments (361 KB)
Attached file: mie-September-2022.pdf;

Yeay... suru revisiiiiii

From: Management in Education <onbehalfof@manuscriptcentral.com>
Sent: Friday, September 16, 2022 1:55 AM
To: Christina Wirawan <christina.wirawan@eng.maranatha.edu>
Subject: Management in Education - Decision on Manuscript ID MIE-22-042

15-Sep-2022

Dear Christina,

Manuscript ID MIE-22-042 entitled "EFFECTIVENESS OF ONLINE LEARNING IN NON-ONLINE CLASSES DURING THE PANDEMIC" which you submitted to Management in Education, has been reviewed. The comments of the reviewer(s) are included at the bottom of this letter.

The reviewer(s) have recommended major revisions to your manuscript before it can be considered for publication. I therefore invite you to respond to the reviewer(s)' comments below and revise your manuscript, after which it will be returned to the reviewer(s) for further consideration.

To revise your manuscript, log into https://mc.manuscriptcentral.com/mie and enter your Author Center, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision.

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Once again, thank you for submitting your manuscript to Management in Education and we look forward to receiving your revision.

Best wishes,

Dr. Paul Armstrong
Editor in Chief
Editor: Management in Education
mieeditors@gmail.com

Reviewer(s)' Comments to Author:

Reviewer: 1

Comments to the Author
This has potential as a paper of interest. The abstract gave a clear statement of intent and the reference list appeared adequate. The paper does require a thorough edit; as it is written as a report, it should be written in past tense. Given the topic I am not sure that a quantitative method was the best. Your discussion does not really link to the quantitative data. I don't believe you made the best use of this data. Given you collected data from four cohorts of students, I would have anticipated some discussion about the development between cohorts; from those who had to immediately transfer to online learning and those who were using that three years later. I think you tried to pick that up in Table 2 but there was nothing of this in the discussion. The SWOC analysis had merit. It would be more useful as qualitative data. I am not sure quantifying it was of much use.
In terms of presentation of results, it would benefit the reader if you explained the scores before you inserted the tables. For example, with Table 1 it would have been helpful to know you had used a Likert scale before I read the results.
You noted 'unpreparedness' as one of the challenges, which it was, but is it still a challenge? One of the challenges with writing on the effects of the pandemic is to corral it. Are you writing on the pandemic or are you analysing the effectiveness of online learning? Is SPADA still the LMS of choice? This is not mentioned. I think having gathered this data, the paper is worth rewriting but i would recommend focusing more on the quantitative data you have collected and perhaps extending it through some semi structured interviews. It is another story waiting to be told.

Reviewer: 2

Comments to the Author
I enjoyed learning more about the swift change to online learning in Indonesia. I found your citations interesting in that context. I think however that for a wide, international audience, the article needs major revision to provide more detail of context and to focus on the effectiveness of online learning in a situation where institutions need to move online rapidly and as a result of government intervention. I attach an annotated copy of the manuscript with my comments.

4. Submit revisi 1 6-11-2022

Dr. Paul Armstrong

Chief Editor

Management in Education

7 November 2022

Resubmission of manuscript ID: MIE-22-042

Dear Dr. Armstrong,

First, we would like to thank you for your response and attention.

Please find attached a revised version of our manuscript entitled "Effectiveness of online learning in non-online classes during the pandemic" which we would like to resubmit for consideration for publication.

Thank you for the editor and reviewer's comments. The comments were highly insightful and enabled us to greatly improve the quality of our manuscript. In the following pages are our point-by-point responses to each of the comments.

We hope that the revisions in the manuscript and our accompanying responses will be sufficient to make our manuscript suitable for publication in Management in Education.

We thank you for your consideration.

Christina Wirawan,

Maranatha Christian University

christina.wirawan@eng.maranatha.edu

+6281 2211 9907

Reviewer's 1 comment

- **Reviewer comment:** To more focus on quantitative data.
  Response: First, we want to thank you for your comments and input, we appreciate that, and will become learning for us. We have used quantitative data in the discussion, such as by processing data with crosstabulation, and multiple linear regression. However, we add some emphasis on the use of quantitative data, as on pages 10 lines 1 to 8, and also table 4.

- **Reviewer comment:** To discuss developments between groups; of those who should immediately switch to online learning and those who use it three years later
  Response: We have tested with crosstab about the differences in the effectiveness of online learning between classes as shown in Figure 2 page 9, and the results are not correlated, so we do not discuss this further. However, we added crosstabs between classes for the influential variables based on multiple linear regression, namely the variables X19, X7, and X20 (on pages 10 rows 1 to 8, and Table 4). Based on this processing, only X7 shows differences between classes as discussed on page 10 lines 1 to 8.

- **Reviewer comment:** To explain the Likert scale before the table of results
  Response: We have reordered, with the Likert scale explanation written first (to table 1), then the other tables (line 27 page 3).

- **Reviewer comment:** We state that unpreparedness is one of the challenges, which it was, but is it still a challenge?
  Response: Currently, unpreparedness is no longer a problem, because now things have been done related to online learning needs. Therefore, we have revised the statement.

- **Reviewer comment:** To mention whether SPADA is still the LMS of choice?
  Response: SPADA is still a mandatory LMS until now, but it is getting better because it is continuously being developed. We add the statement on page 12, line 27.

Reviewer's 2 comment

- **Reviewer comment:** To more detail of context and to focus on the effectiveness of online learning
- **Response:** Thank you very much for your comments and input, we appreciate it, and we believe it will make our articles better and become valuable lessons for us. We try to put more emphasis on discussing how institutions, lecturers, heads of study programs, and students anticipate conditions in which learning must change suddenly from face-to-face to online. We edited and added some sections, hopefully, it can accommodate.

- **Reviewer comment:** Does this forbidden to hold face-to-face meetings mean all forms of face-to-face gatherings or that schools and universities were in effect closed and had to go online? Did this include staff as well as students?
  Response: At the first of the pandemic, only student activities were forbidden to be conducted face-to-face. Lecturers and staff are still allowed to do activities on campus. But at a certain time, because the pandemic was getting worse, lecturers and staff are also asked to work from home. The explanation is included on page 1, lines 8 to 10.

- **Reviewer comment:** To express more clearly: is the hypothesis that online learning is less effective than face-to-face or that learning methods not developed for online learning are less effective when transferred online?
  Response: The hypothesis that online learning may not be as effective as face-to-face learning occurs because universities are not at all ready with various tools for online learning, but have to change to online learning suddenly. Platform devices, lecturers, students, learning materials, and even policies do not yet exist, so it is feared that learning effectiveness is lacking. We explain on page 1 lines 15 to 17.

- **Reviewer comment:** To be more focused on what happens when institutions and lecturers need to move online rapidly
  Response: We added a few sections to emphasize the focus on this. We add a research question on page 2 lines 4 and 5, page 2 lines 21 to 23, page 3 line 5, page 10 lines 14 to 20, and page 11 lines 1 to 2.

- **Reviewer comment:** To give information about Indonesian Online Learning System
  Response: We add the information on page 2 lines 20 to 21.

- **Reviewer comment:** To detail the number of students/lecturers/institutions involved

  Response: In this study, quantitative data on the effectiveness of learning only took students, namely as many as 75 students (page 5 line 1, and page 8 line 27). However, to find out what to do when you have to immediately move to online learning and SWOC analysis, we involve students, lecturers, and study program leaders.

- **Reviewer comment:** To include comparative data about on-time online learning lectures.

  Response: We add that online lectures are 50% more accurate than face-to-face lectures based on the survey conducted on page 11 line 17.

- **Reviewer comment:** To explain whether students' reluctance to group work is stronger than expected.

  Response: On page 12 lines 4 to 7 we explain that new students experience greater difficulties than students who have studied for several semesters because new students do not know their classmates. This is because once they enter college, they immediately carry out online learning, they have never met each other.

- **Reviewer comment:** The proposed things that can be done to improve the situation are very specific to the Indonesian context and engineering rather than widely applicable.

  Response: Indeed, the proposal that we have compiled is based on data from Indonesia, the Faculty of Engineering. We explicitly mention it in Indonesia on pages 13 lines 6 to 7. However, for other places and other faculties experiencing similar conditions, the difficulties will likely be the same, so this proposal can also be useful, as we include on pages 13 lines 19 to 20.

EFFECTIVENESS OF ONLINE LEARNING IN NON-ONLINE CLASSES DURING THE PANDEMIC

Journal:	*Management in Education*
Manuscript ID	MIE-22-042.R1
Manuscript Type:	Original Manuscript
Keywords:	COVID-19, effectiveness, online learning, SWOC, university
Abstract:	The COVID-19 pandemic that has been going on since the beginning of 2020 has forced governments to take a policy to implement online learning. This policy is an effort to break the chain of virus spread in education clusters. For schools and universities that are not used to carrying out online learning, this condition is a problem. Therefore, measurement is needed to ensure effectiveness. In this study, the effectiveness was measured using the variables specified in the Indonesian Online Learning System (Sistem Pembelajaran Daring (SPADA)) 2019 set by the Indonesian government. Data collection was carried out by quantitative and qualitative methods. Quantitative analysis was carried out through questionnaires administered to students while qualitative was carried out by interviewing students and lecturers. The data was processed using cross-tabulation analysis and multiple linear regression. Strengths, Weaknesses, Opportunities, and challenges were analyzed to assess online learning. As research results, it is found that online learning is quite effective, but there are still many things that can be improved to increase the effectiveness of online learning.

Keywords: COVID-19, effectiveness, online learning, SWOC, university |
| | |

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EFFECTIVENESS OF ONLINE LEARNING IN NON-ONLINE CLASSES DURING THE PANDEMIC

Abstract

The COVID-19 pandemic that has been going on since the beginning of 2020 has forced governments to take a policy to implement online learning. This policy is an effort to break the chain of virus spread in education clusters. For schools and universities that are not used to carrying out online learning, this condition is a problem. Therefore, measurement is needed to ensure effectiveness. In this study, the effectiveness was measured using the variables specified in the Indonesian Online Learning System (Sistem Pembelajaran Daring (SPADA)) 2019 set by the Indonesian government. Data collection was carried out by quantitative and qualitative methods. Quantitative analysis was carried out through questionnaires administered to students while qualitative was carried out by interviewing students and lecturers. The data was processed using cross-tabulation analysis and multiple linear regression. Strengths, Weaknesses, Opportunities, and challenges were analyzed to assess online learning. As research results, it is found that online learning is quite effective, but there are still many things that can be improved to increase the effectiveness of online learning.

Keywords: *COVID-19, effectiveness, online learning, SWOC, university*

1. Introduction

The Coronavirus disease 2019 (COVID-19) was a problem faced by almost all countries in the world. With the severity of the consequences caused by COVID-19, the governments of countries have taken actions, such as imposing large-scale social restrictions and lockdowns.

Indonesia is a country in Southeast Asia, which has also been affected by the COVID-19 pandemic. Therefore, the Indonesian government has also taken large-scale social distancing. Face-to-face meetings and activities of students were prohibited in colleges and universities, which affected the education sector. Activities for all students are now conducted online. Initially, staff and lecturers were still permitted to conduct activities on campus or at school, but after a certain amount of time, the campus was completely shut down. (Ministry of Higher Education of the Republic of Indonesia, 2020). This decision was unexpected and presented challenges for classes that had been doing face-to-face learning (non-online learning) before the pandemic.

This shift made the institutions worried about whether the learning process was as effective as face-to-face learning. This is a problem since the institution never had used online learning; as a result, there are no supporting guidelines, no ready-to-use equipment, and neither the lecturers nor the students have the necessary abilities to deal with it.

X University's Industrial Engineering Study Program is one study program that initially uses non-online learning methods. This study program's learning method suddenly needs to change to online learning. There is a need to research how successful online learning is and ==how institutions and teachers prepare for this abrupt transformation in light of all the limitations and challenges.== This research utilized the study program in question as a case under such circumstances.

Various studies have been carried out on the effectiveness of online learning, both for classes that are indeed conducted online (such as Buttner & Black, 2014; Means, Toyama, Murphy, & Baki, 2013), as well as classes that were originally non-online but were forced to go online (such as Agarwal & Dewan, 2020; Baber, 2022; Satyawan, Wahjoedi, & Swadesi, 2021). Research has also been carried out to identify barriers to the effectiveness of online learning, (such as Heng & Sol, 2021; Ramli, Majid, & Badyalina, 2020) and the positive outcomes resulting from online learning (Lorenzetti, 2013; Nguyen, 2015). Some studies compare online learning with non-online learning methods (such as Chang, Wang, Lin, Cheng, & Chiang, 2021; Darkwa & Antwi, 2021).

Even though there have been numerous studies on online learning, research on the effectiveness of online learning for initially non-online classes is still scarce. Additionally, neither publications discussing how the institution made this abrupt transition nor studies on the efficiency of online learning based on the five components of the government-mandated Indonesian Online Learning System (==*Sistem Pembelajaran Daring (SPADA)*==) could be ==discovered. This study is helpful for evaluating the efficacy of online learning that is implemented abruptly, figuring out how to make it better, and knowing how efforts are being made for this improvement.==

2. Literature Review

Several researchers have proven that online learning classes opened are effectively conducted learning processes (Buttner & Black, 2014; Means et al., 2013; Nguyen, 2015). Some researchers have found the positive things obtained from online learning, namely cost-effective implementation, ease to form world-class (Lorenzetti, 2013), enhances better students' test scores and access to learning materials, improves learning perceptions, reduces failures, and improved relations between students (Nguyen, 2015).

However, institutions in Indonesia were obliged to switch from face-to-face study to online learning almost immediately. This occurred unexpectedly, and no plans for online learning had been established. Considering the implementation of online learning which is very

1
2
3   1   different from face-to-face learning, there are concerns about the effectiveness of online
4
5   2   learning.
6
7   3   Research has been carried out before by several researchers and it is found that online
8
9   4   learning is effective (Agarwal & Dewan, 2020; Baber, 2022; Satyawan et al., 2021; Suprianto
10
11   5   et al., 2020), <mark>However, research on the efforts undertaken to effect change is still limited</mark>. On
12
13   6   the other hand, other academics point out challenges or problems with online learning,
14
15   7   including lack of digital skills, socioeconomic variables, workload, evaluation and supervision,
16
17   8   and incompatibility with certain courses (Heng & Sol, 2021). Other researchers find that online
18
19   9   learning is boring, unengaging, needs personal attention, lacks practical experience (Dhawan,
20
21   10   2020), and causes stress for students (Argaheni, 2020). However, no article was found using
22
23   11   the five aspects of the SPADA.
24
25   12   SPADA is a program of the Indonesian government to increase equitable access to quality
26
27   13   learning in Higher Education" (Sekretariat Direktorat Jenderal Pendidikan Tinggi Kementrian
28
29   14   Pendidikan dan Kebudayaan, 2015). SPADA was designed to support Independent Learning
30
31   15   Independent Campus called MBKM sets up by the Indonesian government. This MBKM
32
33   16   encourages students to learn outside of the classroom, whether on the campuses of other
34
35   17   institutions, corporations or even in the community.

     18

36   19   **3. Methodology**
37
38   20   As described earlier, the assessment of online learning performance is carried out based
39
40   21   on 5 aspects of *SPADA*. The five aspects of the performance consist of:
41
42   22   • Lesson plan
43
44   23   • Learning Activities
45
46   24   • Delivery/delivery strategy
47
48   25   • Learning media and technology
49
50   26   • Study assistance services
51
52   27   <mark>The Likert scale was employed as shown in Table 1 to evaluate the elements and efficacy.</mark> As
53
54   28   shown in Table 2, these five factors are applied to 28 variables. A questionnaire is created using
55
56   29   these factors. While four criteria are used to evaluate the efficacy of online learning, as shown
57
58   30   in Table 3.

59   31

60   32

       33

       34

1

Table 1. Likert Scale

Score weight	4	3	2	1
Performance Rate	Strongly Agree	Agree	Disagree	Strongly Disagree
Effectivity	Strongly Agree	Agree	Disagree	Strongly Disagree

2

3

Table 2. Online learning performance

Var. No.	Variable statements	Score
X1	Online learning materials are oriented towards student independence	3.19
X2	Online learning materials emphasize student creativity and innovation in learning	3
X3	Online learning materials are arranged systematically	3.01
X4	Online learning materials are in accordance with the predetermined learning plan	3.08
X5	Online learning is carried out according to a predetermined schedule	3.25
X6	It is easy to collect assignments/reports online	3.12
X7	Online group work can be done easily	2.31
X8	Presentation of assignments online is easy	2.91
X9	The online exam process can be done easily	2.89
X10	The process of monitoring and evaluating online learning can guarantee the quality of learning	2.64
X11	The online learning plan for one semester is clearly conveyed at the beginning of the lecture	3
X12	Online learning materials are presented in an interesting way	2.75
X13	Online learning materials are delivered clearly	2.89
X14	The interaction between lecturers and students in online learning takes place actively	2.81
X15	Delivery of online learning materials (lectures/practicum) facilitates students to learn actively (practice questions, case studies, discussions)	2.99
X16	Lecturer / Assistant has an adequate level of technology and media mastery	3.12
X17	Lecturers always accompany during online learning	3.03
X18	Feedback from lecturers in online learning can be used by students to better understand the lecture material	2.99
X19	Online learning provides an opportunity to reflect on material understanding through self-assessment	2.95
X20	The characteristics of the material delivered are in accordance with the online learning media used	3.04
X21	Easy-to-use online learning platform	2.93
X22	Online learning media (Whatsapp, Line, Google Meet, Zoom, etc.) can be used easily	3.29
X23	Online learning materials can be downloaded easily	3.24
X24	Administration provides administrative service support during online learning	3.08
X25	Lecturers provide support in overcoming difficulties in online learning	3
X26	Information about student learning progress and success can be accessed easily in online learning	3
X27	Study Program provides a means of submitting input/complaints for students related to online learning	2.97
X28	Internet quota is always available when participating in online learning	2,83
	Average	2.93

4

5

1 Seventy-five Industrial Engineering students from the Class of 2017–2020 were given surveys

2 to complete using Google Forms. The survey asks about student characteristics as well as the

3 usefulness and performance of online learning.

4

5 Table 3. Online learning performance effectiveness

Var. No.	Variable statements	Score
Y1	Online learning improves my understanding of course material	2,52
Y2	Online learning increases my motivation to study	2,43
Y3	Online learning increases my independence in learning	2,99
Y4	Online learning increases my opportunities to actively participate in learning activities	2,72
	Average	2.66

6

7

8 Multiple linear regression was used to examine the effectiveness of online learning and

9 performance evaluation. The SWOC analysis was then carried out based on the outcomes of

10 the multiple linear regression and the cross-tabulation analysis. Five students, three professors,

11 and three university administrators were interviewed as part of studies on how institutions adopt

12 change. The suggestion for improvement was based on the SWOC study. The research was

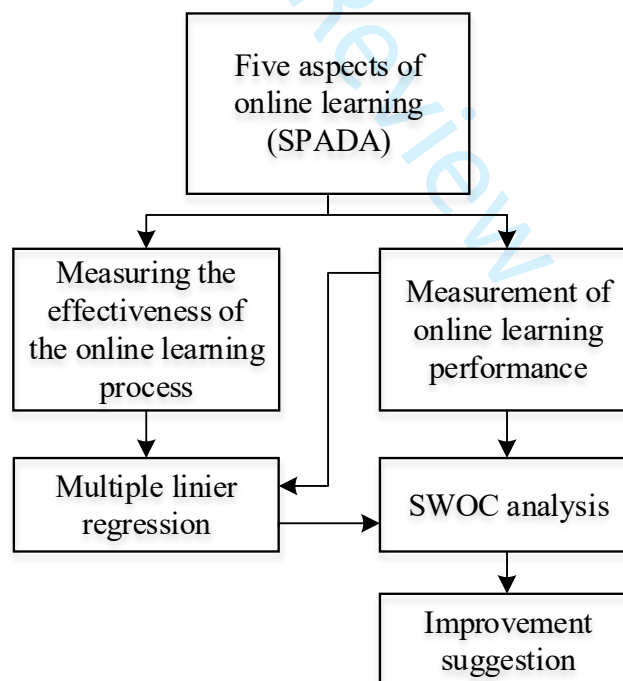13 conducted in accordance with the Figure 1 flow diagram.

14

15

16 Figure 1. Research flow

17

18

1 Measurement of online learning performance is carried out using the following formula:

$$\bar{X} = \frac{\sum_{i=1}^{k} X_i}{n} \qquad (1)$$

2 where:

3 $\bar{X}$ = average score of performance level

4 X_i = the score of ith respondent's performance level

5 n = number of respondents

6 To find out the online learning performance variables that affect the effectiveness, the

7 multiple linear regression method is used with the following equation:

8

$$Y = a + b_1 X_1 + b_2 X_2 \ldots + b_n X_n \qquad (2)$$

9 where:

10 Y = online learning process effectivity

11 $X_1, X_2, \ldots, X_n$ =   online learning performance variables

12 a = constant

13 $b_1, b_2, \ldots, b_n$ = regression coefficient

14

15 SWOC analysis can be used to analyze strengths, weaknesses, opportunities, and

16 challenges (Dhawan, 2020). Interviews with both students and lecturers were performed as part

17 of the SWOC study. On the basis of all the data acquired, improvement ideas were developed.

18

19 **4. Result and Discussion**

20 The results of the questionnaires filled out by respondents, namely students of the

21 Industrial Engineering Study Program can be seen in Table 2 and Table 3.

22

23 **4.1 Validity and Reliability Test**

24 The measurement device's accuracy was validated by the validity test. All construct scores were

25 legitimate since they were positively correlated with the overall question score (count r value >

26 r table value). The accuracy of the measurement instrument was examined using the Cronbach

27 Alpha (α) statistical test. Both questionnaires' scores—0.915 for the learning process

28 performance evaluation questionnaire and 0.845 for the learning effectiveness assessment

29 questionnaire—indicate their reliability.

30

31

1 **4.2 Classic Assumption Test**

2 Classical assumption tests need to be carried out to ensure the validity of the use of multiple

3 linear regression, which consists of:

4 o The normality test. The significant value Asym. Sig. (2-tailed) of 0.842>0.05, indicating

5 that the data is normally distributed.

6 o The multicollinearity test. The value of the variance inflation factor (VIF) of all independent

7 variables is less than 10, hence there is no multicollinearity.

8 o A heteroscedasticity test. There are 2 variables (X25 and X5) that have a Sig value. <0.05,

9 which indicates that heteroscedasticity occurs, then the two variables are excluded.

10 o A linearity test. From the test results, there are 4 variables (X4, X9, X11, X14) that have

11 Deviation from Linearity Sig values. <0.05, which indicates that there are no significant

12 linear correlations, then these variables are excluded.

13

14 **4.3 Multiple Linear Regression**

15 To determine the performance factors of the online learning process that influence

16 learning effectiveness, multiple regression analysis was used. The average of the efficacy of the

17 online learning process is utilized as the dependent variable in Table 3, while the 22

18 performance characteristics for the online learning process are used as independent variables in

19 Table 2.

20 The effect of the independent variables together on the dependent variable is carried out

21 by conducting a simultaneous significant test (F test), with the following hypothesis

22 formulation:

23 H_0: The regression coefficient is not significant

24 H_1: The regression coefficient is significant

25

26 The level of significance (α) used is 5%.

27

28 Decision-making criteria:

29 Reject H_0 if the significance value < 0.05

30 Accept H_0 if the significance value > 0.05

31

32 Based on the processing results, the value of Sig. of 0.000 (<0.05), so the decision is to

33 reject H_0. This means that the regression coefficient is significant, so the performance of the

34 online learning process has a significant effect on the effectiveness of learning.

1   The effect of each independent variable on the dependent variable is carried out by

2   performing a partial significant test (T-test) with the following hypothesis formulation:

3

4   H_0: the online learning process performance variable does not affect the effectiveness of online

5   learning

6   H_1: the online learning process performance variable does affect the effectiveness of online

7   learning

8

9   Based on the results of processing, the values of Sig X19, X7, and X20 are less than 0.025, then

10   declared to have a significant effect on the dependent variable, with the regression equation:

11

12   Y = 0.011 + 0.388 X19 + 0.249 X7 + 0.308 X20   (3)

13

14   Information :

15   Y   =   effectiveness of online learning

16   0.011   =   constant

17

18   Three variables have a direct impact on how successful online learning is, according to

19   the multiple regression study. These factors can account for up to 50.2% of the efficiency of

20   online learning (shown by the adjusted R2 value). This shows that 49.8% are still excluded and

21   provide a chance for more study. The dependent variable and independent variable have a

22   significant positive relationship as indicated by multiple correlation values (R) of 0.723. These

23   three influencing factors may be taken into account to increase the efficiency and efficacy of

24   online learning.

25

26   **4.4 Cross Tabulation Analysis (Crosstab)**

27   Seventy-five students from the 2017–2020 academic year completed the questionnaire; their

28   profiles are depicted in Figure 2. As a probability value of 0.809>0.05, there is no correlation

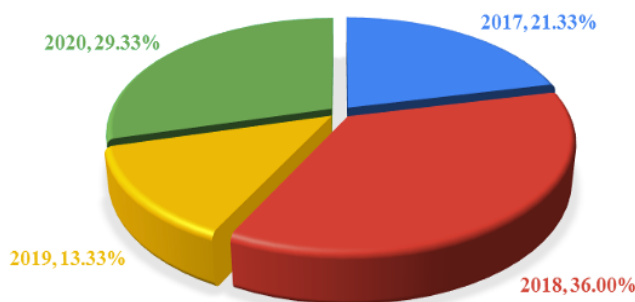29   between the class and the efficiency of online learning.

Figure 2. Class Pie Chart

The proportion of the GPA of students who fill out the questionnaire is shown in Figure 3. Cross-tabulation analysis was performed between this data and the effectiveness of online learning, which yielded the χ^2 probability value of 0.451>0.05. That means that there is no correlation between them.
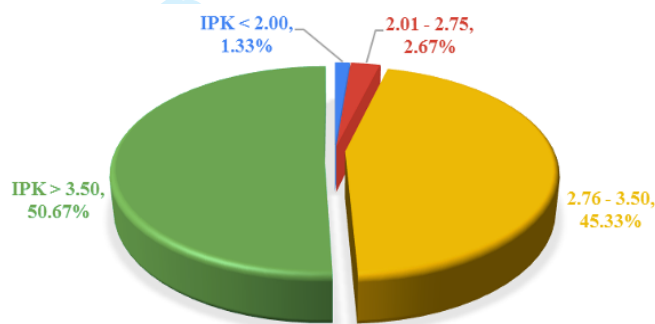

Figure 3. GPA (IPK) Pie Chart

Figure 4 depicts the online learning media chosen by students. Video conference is the most popular. The χ^2 with the online learning efficacy was 0.48>0.05. This demonstrates that there is no correlation between them.
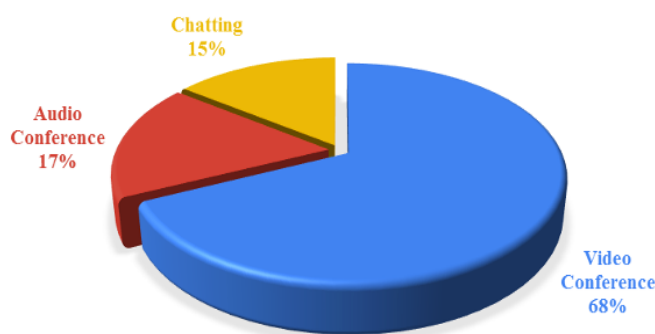

Figure 4. Preferred Media Pie Chart

As shown in Table 4, the factors X19, X7, and X20 that the multiple regression analysis indicated had an impact were used in the cross-tabulation to determine whether there were variations in effectiveness across classes. Only X7 (ease of working in groups) of these factors indicates a difference between groups (probability value: 0.04–0.05). Because they have not had much time to get to know one another, new students who are required to work in groups online face more challenges. Students who have been in college for two to three years have no or little challenges because they already know one another, but students who have just started their second year are still having some difficulty.

Table 4. The results of the cross-tabulation of influential variables

		X19					X7					X20				
		1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total
	2017															
	Count	0	2	11	3	16	2	5	6	3	16	1	1	11	3	16
	% of Total	0,0	2,7	14,7	4,0	21,3	2,7	6,7	8,0	4,0	21,3	1,3	1,3	14,7	4,0	21,3
	2018															
	Count	0	4	20	3	27	9	11	6	1	27	0	3	19	5	27
C	% of Total	0,0	5,3	26,7	4,0	36,0	12,0	14,7	8,0	1,3	36,0	0,0	4,0	25,3	6,7	36,0
L	**2019**															
A	Count	1	1	8	0	10	0	2	8	0	10	0	1	9	0	10
S	% of Total	1,3	1,3	10,7	0,0	13,3	0,0	2,7	10,7	0,0	13,3	0,0	1,3	12,0	0,0	13,3
S	**2020**															
	Count	0	2	19	1	22	4	10	6	2	22	0	1	18	3	22
	% of Total	0,0	2,7	25,3	1,3	29,3	5,3	13,3	8,0	2,7	29,3	0,0	1,3	24,0	4,0	29,3
	Total															
	Count	1	9	58	7	75	15	28	26	6	75	1	6	57	11	75
	% of Total	1,3	12,0	77,3	9,3	100,0	20,0	37,3	34,7	8,0	100,0	1,3	8,0	76,0	14,7	100,0
Pearson Chi-Square Asymp. Sig (2-sided)		0,32					0,04					0,64				

4.5 SWOC Analysis

According to the findings of a study on change implementation efforts, institutions look for the most suitable online learning platform when there are rapid changes. Trial and error was used to conduct this search. The most appropriate and effective platform can eventually be identified. The LMS and online learning platforms are quickly mastered by lecturers, who subsequently turn their lectures into videos or narrated slides and deposit them there. Additionally, instructors strive to make their lectures as effective as in-person instruction. Additionally, the platform and LMS had to be learned by the students, and they had to adjust to

any new procedures that emerged. The college promotes online learning by creating different policies and providing a more adequate LMS.

The SWOC analysis was performed to determine the strengths, weaknesses, opportunities, and challenges associated with the present online learning process. The study was based on the value and efficacy of online learning, as well as the findings of multiple linear regression analysis. Classification of value quality is carried out based on the established criteria as shown in Table 5.

Table 5. Quality Criteria

Range	Quality
$1 \leq$ value < 1.75	Very bad
$1.75 \leq$ value < 2.5	Bad
$2.5 \leq$ value < 3.25	Good
$3.25 \leq$ value ≤ 4	Very good

4.5.1 Strength

The average score of online learning performance is 2.93 (good). This can be seen as a strength. However, the overall achievement of the variables is still far from the maximum value, so there is still an opportunity for improvement.

In terms of the X5 variable, the findings of the interviews with students and instructors show that online lectures are implemented 50% more promptly than face-to-face lectures. First, in regard to the X22 variable, the LMS has not been actively socialized or emphasized as a tool for learning source materials for face-to-face interaction. But in the second semester, instructors and students received training on how to utilize it. The creation of learning resources suitable for online courses and their availability on a student-accessible LMS were prerequisites for lecturers.

Variables X1, X3, X4, X6, X16, X17, X20, and X24 gain scores above 3, which means that they are considered very good by students. The learning materials have been specifically designed for online learning. Lecturers have studied technology and media related to online learning so that online learning can be carried out properly. On the other hand, administrative officers are also prepared to support online learning implementation.

4.5.2 Weaknesses

Based on student assessments, there is a variable that is considered bad, namely X7. One of the important things for Industrial Engineering graduates is to be able to work in groups. Therefore, many activities are conducted in group work to learn to lead, be led, communicate, relate, make decisions together, resolve conflicts, etc. Working in a group is uncomfortable for students, especially new ones since the learning must be done entirely online. Since group projects were a regular part of in-person lectures, this came as a surprise to the students. They complain about the hefty quota fees, the unavailability of gadgets, and the fact that the students did not know each other yet. Additionally, because group members occasionally engage in other activities, the dynamics of the workgroup are occasionally restricted.

4.5.3   Opportunity

The effectiveness of online learning led to the possibility of hybrid or online learning in the future. Because instructors produced learning materials and consistently uploaded them to the LMS, some students can even achieve superior results while learning online. Although it is still a required LMS from the government, SPADA is still mandatory, with superior and more efficient. The information is freely accessible to the students, who may then debate it with the professors.

By proving that online learning was effective and also becoming support for universities in Indonesia to conduct MBKM. The MBKM program is supported because:

1. Students can take lessons in far locations.
2. Allow the university to collaborate with other parties, for example, micro, small, and medium enterprises (MSMEs) to be involved in lectures and businesses.
3. University can outreach students in remote areas.
4. Cooperation with overseas universities can easily be accommodated.

4.5.4 Challenges

In contrast to the opportunities previously outlined, several obstacles materialized. On the student side, signal, quota, and gadget availability are issues that many students encounter. The third issue is that students' eye health is impacted by online learning due to prolonged and frequent usage of technology. Next, issues related to motivational issues arise. The informal learning environment at home makes learning less efficient. The last difficulty is the tension that students undergo since they are unable to socialize and communicate with peers.

For lecturers, online learning is tough because they must quickly create relevant learning materials, and develop ways to conduct lectures while missing out on interaction with students

1   and colleagues. While the challenge for the study program is to design practicums so that they

2   can be done online, rather than in a laboratory where students get experience by doing

3   experiments themselves.

4   Online learning has the potential to replace traditional classroom instruction in the future,

5   given its advantages, strengths, and effectiveness. With the shortcomings and difficulties come

6   the need to solve them, particularly for Indonesian universities that must swiftly switch from

7   in-person to online instruction. There are other options, including:

8   1. To carry out group assignments, lecturers must provide a time slot and open the media.

9   Students get clarity of time and lecturers can supervise them.

10   2. Planning synchronous learning, and assignments in ways that improve relations between

11   students, for example by holding games, providing time to chat together, et cetera.

12   3. Allocate funds to help students who are less well off financially. With online learning, the

13   university's operational costs have decreased. These cost savings should be diverted to help

14   students in need of online learning support equipment.

15   4. Create work units to help lecturers prepare learning materials, such as making interesting

16   learning videos, presentation slides, etc.

17   5. The study program is exploring creating a virtual reality laboratory so that students can still

18   get an experience like in a laboratory.

19   These concepts can be used in locations or nations other than Indonesia that have comparable

20   settings and situations.

21

5. Conclusion

23   Online education has become essential as a result of the COVID-19 epidemic. The

24   unexpected necessity to perform online learning caused some distress and misunderstanding at

25   the beginning of the epidemic, but these issues may eventually be handled. However, online

26   learning has proven to be a challenge for students, lecturers, study programs, and administrative

27   personnel. Online education can then be an alternative to traditional classroom instruction at

28   universities.

29   Inadvertently, the epidemic that forces online learning speeds up the use of digital

30   technologies in the classroom. The employment of digital technology in online learning can be

31   advantageous for the Indonesian government's MBKM, international, and outreach activities.

32   Further study may be focused by searching for other variables that impact learning

33   effectiveness as the variables discovered can only account for 50.2% of the variance in learning

34   efficiency. More research may be conducted by reassessing the learning efficacy once the online

learning system has been improved and put into use. Additional research may be done to examine certain student difficulties including motivation, wellbeing, and stress levels.

Conflict of Interest

The authors declare no conflict of interest

Acknowledgment

Researchers would like to thank

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5. Bukti penerimaan revisi 1 6-11-2023

Management in Education MIE-22-042.R1

06-Nov-2022

Dear Dr. Wirawan:

Your revised manuscript entitled "EFFECTIVENESS OF ONLINE LEARNING IN NON-ONLINE CLASSES DURING THE PANDEMIC" has been successfully submitted online and is presently being given full consideration for publication in Management in Education.

Your manuscript ID is MIE-22-042.R1.

You have listed the following individuals as authors of this manuscript:
Gozaly, Jimmy; Talar, Yulianti; Wirawan, Christina; Kurniawan, Axel

Please mention the above manuscript ID in all future correspondence or when calling the office for questions. If there are any changes in your street address or e-mail address, please log in to ScholarOne Manuscripts at https://mc.manuscriptcentral.com/mie and edit your user information as appropriate.

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Thank you for submitting your manuscript to Management in Education.

Sincerely,
Paul Armstrong
Management in Education
mieeditors@gmail.com

6. Hasil review 2 3-12-2022

Fw: Management in Education - Decision on Manuscript ID MIE-22-042.R1

Christina Wirawan <christina.wirawan@eng.maranatha.edu>
Tue 12/6/2022 6:07 AM
To:Yulianti <yulianti@eng.maranatha.edu>;Jimmy Gozaly <jimgozaly@yahoo.com>

Hore... skrg minor

From: Management in Education <onbehalfof@manuscriptcentral.com>
Sent: Saturday, December 3, 2022 3:12 AM
To: Christina Wirawan <christina.wirawan@eng.maranatha.edu>
Subject: Management in Education - Decision on Manuscript ID MIE-22-042.R1

02-Dec-2022

Dear Christina

Manuscript ID MIE-22-042.R1 entitled "EFFECTIVENESS OF ONLINE LEARNING IN NON-ONLINE CLASSES DURING THE PANDEMIC" which you submitted to Management in Education, has been reviewed. The comments of the reviewer(s) are included at the bottom of this letter.

The reviewer(s) have recommended some minor revisions to your manuscript before it can be published. I therefore invite you to respond to the reviewer(s)' comments below and revise your manuscript, after which the article will be returned to the reviewer(s) for approval.

To revise your manuscript, log into https://mc.manuscriptcentral.com/mie and enter your Author Center, where you will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision." Your manuscript number has been appended to denote a revision.

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Once the revised manuscript is prepared, you can upload it and submit it through your Author Center.

When submitting your revised manuscript, you will be able to respond to the comments made by the reviewer(s) in the space provided. You can use this space to document any changes you make to the original manuscript. In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the reviewer(s).

IMPORTANT: Your original files are available to you when you upload your revised manuscript. Please delete any redundant files before completing the submission. Also please avoid placing your name on any of the documents that will be read by the reviewers.

Because we are trying to facilitate timely publication of manuscripts submitted to Management in Education, your revised manuscript should be uploaded as soon as possible. If it is not possible for you to submit your revision in a reasonable amount of time, we may have to consider your paper as a new submission.

Once again, thank you for submitting your manuscript to Management in Education and we look forward to receiving your revision.

Best wishes
Dr. Paul Armstrong
Management in Education
Paul.Armstrong@manchester.ac.uk

Reviewer(s)' Comments to Author:

I found the emphasis now on reviewing a situation where institutions have to respond without warning or preparation to move online makes the paper of wider interest, thank you. There is one point where you refer to eye health on page 12 lines 28 - 30 and you need evidence or a source to support your assertion as this is contested. I do not know of particular sources on eye health but the effect on over physical inactivity is covered in relevant literature e.g. Dunton, G.F., Do, B. and Wang, S.D., 2020. Early effects of the COVID-19 pandemic on physical activity and sedentary behavior in children living in the US. BMC public health, 20(1), pp.1-13. This is from the USA so you may be able to find more relevant sources. I also wanted to encourage you to continue to pursue this research interest. In the UK, many institutions have gone back to face to face, many others are continuing with a blend of online and f2f and some have stayed online. In my view, there is a continuing need to look at what is happening in institutions that went online during the pandemic, what has been learned and how effective it is.

7. Submit revisi 2 12-12-2022

Dr. Paul Armstrong

Chief Editor

Management in Education

12 December 2022

Resubmission of manuscript ID: MIE-22-042

Dear Dr. Armstrong,

First, we would like to thank you for your response and attention.

Please find attached a revised version of our manuscript entitled "Effectiveness of online learning in non-online classes during the pandemic" which we would like to resubmit for consideration for publication.

Thank you for the editor and reviewer's comments. The comments were highly insightful and enabled us to greatly improve the quality of our manuscript. In the following pages are our point-by-point responses to each of the comments.

We hope that the revisions in the manuscript and our accompanying responses will be sufficient to make our manuscript suitable for publication in Management in Education.

We thank you for your consideration.

Christina Wirawan,

Maranatha Christian University

christina.wirawan@eng.maranatha.edu

+6281 2211 9907

Reviewer's comment

- **Reviewer comment:** The reviewer found that the emphasis now on reviewing a situation where institutions have to respond without warning or preparation to move online
  Response: Very glad to hear this, thank you for your previous comments and inputs

- **Reviewer comment:** To add evidence or a source to support your assertion about eye health problems
- **Response:** We add the references on page 12 line 30

- **Reviewer comment:** To encourage continue to pursue this research interest
  Response: We also suggest the universities do online and hybrid learning, besides face-to-face meetings. We mention it on page 13 line 28. We also add further research directions to do more research about this topic (page 13 line 32 to page 14 line 2). As in England, face-to-face learning has also started in Indonesia, but still with strict regulations and combined with online and hybrid methods.

EFFECTIVENESS OF ONLINE LEARNING IN NON-ONLINE CLASSES DURING THE PANDEMIC

Abstract:	The COVID-19 pandemic that has been going on since the beginning of 2020 has forced governments to take a policy to implement online learning. This policy is an effort to break the chain of virus spread in education clusters. For schools and universities that are not used to carrying out online learning, this condition is a problem. Therefore, measurement is needed to ensure effectiveness. In this study, the effectiveness was measured using the variables specified in the Indonesian Online Learning System (Sistem Pembelajaran Daring (SPADA)) 2019 set by the Indonesian government. Data collection was carried out by quantitative and qualitative methods. Quantitative analysis was carried out through questionnaires administered to students while qualitative was carried out by interviewing students and lecturers. The data was processed using cross-tabulation analysis and multiple linear regression. Strengths, Weaknesses, Opportunities, and challenges were analyzed to assess online learning. As research results, it is found that online learning is quite effective, but there are still many things that can be improved to increase the effectiveness of online learning. Keywords: COVID-19, effectiveness, online learning, SWOC, university

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EFFECTIVENESS OF ONLINE LEARNING IN NON-ONLINE CLASSES DURING THE PANDEMIC

Abstract

The COVID-19 pandemic that has been going on since the beginning of 2020 has forced governments to take a policy to implement online learning. This policy is an effort to break the chain of virus spread in education clusters. For schools and universities that are not used to carrying out online learning, this condition is a problem. Therefore, measurement is needed to ensure effectiveness. In this study, the effectiveness was measured using the variables specified in the Indonesian Online Learning System (Sistem Pembelajaran Daring (SPADA)) 2019 set by the Indonesian government. Data collection was carried out by quantitative and qualitative methods. Quantitative analysis was carried out through questionnaires administered to students while qualitative was carried out by interviewing students and lecturers. The data was processed using cross-tabulation analysis and multiple linear regression. Strengths, Weaknesses, Opportunities, and challenges were analyzed to assess online learning. As research results, it is found that online learning is quite effective, but there are still many things that can be improved to increase the effectiveness of online learning.

Keywords: *COVID-19, effectiveness, online learning, SWOC, university*

1. Introduction

The Coronavirus disease 2019 (COVID-19) was a problem faced by almost all countries in the world. With the severity of the consequences caused by COVID-19, the governments of countries have taken actions, such as imposing large-scale social restrictions and lockdowns.

Indonesia is a country in Southeast Asia, which has also been affected by the COVID-19 pandemic. Therefore, the Indonesian government has also taken large-scale social distancing. Face-to-face meetings and activities of students were prohibited in colleges and universities. Activities for all students are now conducted online. Initially, staff and lecturers were still permitted to conduct activities on campus or at school, but after a certain amount of time, the campus was completely shut down. (Ministry of Higher Education of the Republic of Indonesia, 2020). This decision was unexpected and presented challenges for classes that had been doing face-to-face learning (non-online learning) before the pandemic.

This shift made the institutions worried about whether the learning process was as effective as face-to-face learning. This is a problem since the institution never used online learning; as a result, there are no supporting guidelines, and no ready-to-use equipment and neither the lecturers nor the students have the necessary abilities to deal with it.

X University's Industrial Engineering Study Program is one study program that initially uses non-online learning methods. This study program's learning method suddenly needs to

change to online learning. There is a need to research how successful online learning is and how institutions and teachers prepare for this abrupt transformation in light of all the limitations and challenges. This research utilized the study program in question as a case under such circumstances.

Various studies have been carried out on the effectiveness of online learning, both for classes that are indeed conducted online (such as Buttner & Black, 2014; Means, Toyama, Murphy, & Baki, 2013), as well as classes that were originally non-online but were forced to go online (such as Agarwal & Dewan, 2020; Baber, 2022; Satyawan, Wahjoedi, & Swadesi, 2021). Research has also been carried out to identify barriers to the effectiveness of online learning, (such as Heng & Sol, 2021; Ramli, Majid, & Badyalina, 2020) and the positive outcomes resulting from online learning (Lorenzetti, 2013; Nguyen, 2015). Some studies compare online learning with non-online learning methods (such as Chang, Wang, Lin, Cheng, & Chiang, 2021; Darkwa & Antwi, 2021).

Even though there have been numerous studies on online learning, research on the effectiveness of online learning for initially non-online classes is still scarce. Additionally, neither publications discussing how the institution made this abrupt transition nor studies on the efficiency of online learning based on the five components of the government-mandated Indonesian Online Learning System (*Sistem Pembelajaran Daring (SPADA)*) could be discovered. This study helps evaluate the efficacy of online learning that is implemented abruptly, figuring out how to make it better, and knowing how efforts are being made for this improvement.

2. Literature Review

Several researchers have proven that online learning classes opened are effectively conducted learning processes (Buttner & Black, 2014; Means et al., 2013; Nguyen, 2015). Some researchers have found the positive things obtained from online learning, namely cost-effective implementation, ease to form world-class (Lorenzetti, 2013), enhances better students' test scores and access to learning materials, improves learning perceptions, reduces failures, and improved relations between students (Nguyen, 2015).

However, institutions in Indonesia were obliged to switch from face-to-face study to online learning almost immediately. This occurred unexpectedly, and no plans for online

learning had been established. Considering the implementation of online learning which is very different from face-to-face learning, there are concerns about online learning's effectiveness.

Research has been carried out before by several researchers and it is found that online learning is effective (Agarwal & Dewan, 2020; Baber, 2022; Satyawan et al., 2021; Suprianto et al., 2020), However, research on the efforts undertaken to effect change is still limited. On the other hand, other academics point out challenges with online learning, including lack of digital skills, socioeconomic variables, workload, evaluation and supervision, and incompatibility with certain courses (Heng & Sol, 2021). Other researchers find that online learning is boring, unengaging, needs personal attention, lack practical experience (Dhawan, 2020), and causes stress for students (Argaheni, 2020). However, no article was found using the five aspects of the SPADA.

SPADA is a program of the Indonesian government to increase equitable access to quality learning in Higher Education" (Sekretariat Direktorat Jenderal Pendidikan Tinggi Kementrian Pendidikan dan Kebudayaan, 2015). SPADA was designed to support Independent Learning Independent Campus called MBKM sets up by the Indonesian government. This MBKM encourages students to learn outside of the classroom, whether on the campuses of other institutions, corporations, or even in the community.

3. Methodology

As described earlier, the assessment of online learning performance is carried out based on 5 aspects of *SPADA*. The five aspects of the performance consist of:

• Lesson plan

• Learning Activities

• Delivery/delivery strategy

• Learning media and technology

• Study assistance services

The Likert scale was employed as shown in Table 1 to evaluate the elements and efficacy. As shown in Table 2, these five factors are applied to 28 variables. A questionnaire is created using these factors. While four criteria are used to evaluate the efficacy of online learning, as shown in Table 3.

Table 1. Likert Scale

Score weight	4	3	2	1
Performance Rate	Strongly Agree	Agree	Disagree	Strongly Disagree
Effectivity	Strongly Agree	Agree	Disagree	Strongly Disagree

Table 2. Online learning performance

Var. No.	Variable statements	Score
X1	Online learning materials are oriented towards student independence	3.19
X2	Online learning materials emphasize student creativity and innovation in learning	3
X3	Online learning materials are arranged systematically	3.01
X4	Online learning materials are in accordance with the predetermined learning plan	3.08
X5	Online learning is carried out according to a predetermined schedule	3.25
X6	It is easy to collect assignments/reports online	3.12
X7	Online group work can be done easily	2.31
X8	Presentation of assignments online is easy	2.91
X9	The online exam process can be done easily	2.89
X10	The process of monitoring and evaluating online learning can guarantee the quality of learning	2.64
X11	The online learning plan for one semester is clearly conveyed at the beginning of the lecture	3
X12	Online learning materials are presented in an interesting way	2.75
X13	Online learning materials are delivered clearly	2.89
X14	The interaction between lecturers and students in online learning takes place actively	2.81
X15	Delivery of online learning materials (lectures/practicum) facilitates students to learn actively (practice questions, case studies, discussions)	2.99
X16	Lecturer / Assistant has an adequate level of technology and media mastery	3.12
X17	Lecturers always accompany during online learning	3.03
X18	Feedback from lecturers in online learning can be used by students to better understand the lecture material	2.99
X19	Online learning provides an opportunity to reflect on material understanding through self-assessment	2.95
X20	The characteristics of the material delivered are in accordance with the online learning media used	3.04
X21	Easy-to-use online learning platform	2.93
X22	Online learning media (Whatsapp, Line, Google Meet, Zoom, etc.) can be used easily	3.29
X23	Online learning materials can be downloaded easily	3.24
X24	Administration provides administrative service support during online learning	3.08
X25	Lecturers provide support in overcoming difficulties in online learning	3
X26	Information about student learning progress and success can be accessed easily in online learning	3
X27	Study Program provides a means of submitting input/complaints for students related to online learning	2.97
X28	Internet quota is always available when participating in online learning	2,83
	Average	2.93

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1 Seventy-five Industrial Engineering students from the Class of 2017–2020 were given surveys

2 to complete using Google Forms. The survey asks about student characteristics as well as the

3 usefulness and performance of online learning.

4

5 Table 3. Online learning performance effectiveness

Var. No.	Variable statements	Score
Y1	Online learning improves my understanding of course material	2,52
Y2	Online learning increases my motivation to study	2,43
Y3	Online learning increases my independence in learning	2,99
Y4	Online learning increases my opportunities to actively participate in learning activities	2,72
	Average	2.66

6
7

8 Multiple linear regression was used to examine the effectiveness of online learning and

9 performance evaluation. The SWOC analysis was then carried out based on the outcomes of

10 the multiple linear regression and the cross-tabulation analysis. Five students, three professors,

11 and three university administrators were interviewed as part of studies on how institutions adopt

12 change. The suggestion for improvement was based on the SWOC study. The research was
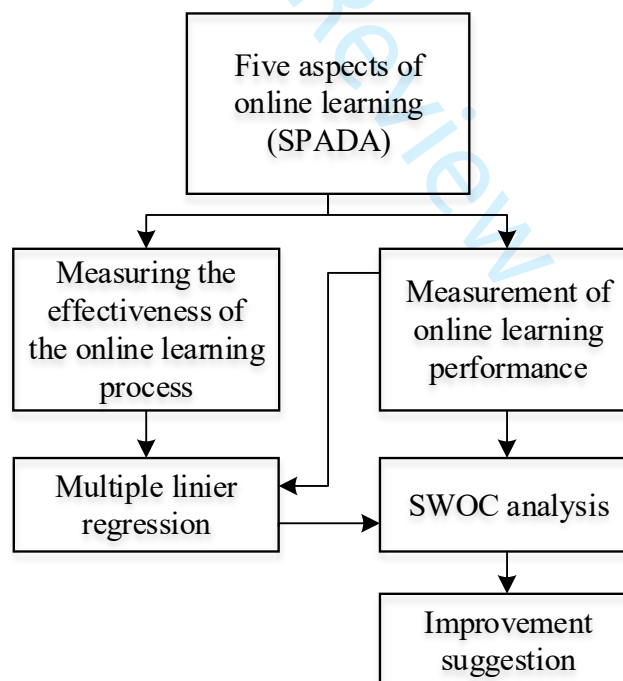
13 conducted following the Figure 1 flow diagram.

14

15
16 Figure 1. Research flow

17
18

1   Measurement of online learning performance is carried out using the following formula:

$$\bar{X} = \frac{\sum_{i=1}^{k} X_i}{n} \qquad (1)$$

2   where:

3    $\bar{X}$ = average score of performance level

4   X_i= the score of ith respondent's performance level

5   n = number of respondents

6   To find out the online learning performance variables that affect the effectiveness, the

7   multiple linear regression method is used with the following equation:

8

$$Y = a + b_1 X_1 + b_2 X_2 \dots + b_n X_n \qquad (2)$$

9   where:

10   Y = online learning process effectivity

11    $X_1, X_2, \dots, X_n$=   online learning performance variables

12   a = constant

13    $b_1, b_2, \dots, b_n$ = regression coefficient

14

15   SWOC analysis can be used to analyze strengths, weaknesses, opportunities, and

16   challenges (Dhawan, 2020). Interviews with both students and lecturers were performed as part

17   of the SWOC study. Based on all the data acquired, improvement ideas were developed.

18

4. Result and Discussion

19

20   The results of the questionnaires filled out by respondents, namely students of the

21   Industrial Engineering Study Program can be seen in Table 2 and Table 3.

22

4.1 Validity and Reliability Test

23

24   The measurement device's accuracy was validated by the validity test. All construct scores

25   were legitimate since they were positively correlated with the overall question score (count r

26   value > r table value). The accuracy of the measurement instrument was examined using the

27   Cronbach Alpha (α) statistical test. Both questionnaires' scores—0.915 for the learning process

28   performance evaluation questionnaire and 0.845 for the learning effectiveness assessment

29   questionnaire—indicate their reliability.

30

31

1   **4.2 Classic Assumption Test**

2   Classical assumption tests need to be carried out to ensure the validity of the use of multiple

3   linear regression, which consists of:

4   o   The normality test. The significant value Asym. Sig. (2-tailed) of 0.842>0.05, indicating

5   that the data is normally distributed.

6   o   The multicollinearity test. The value of the variance inflation factor (VIF) of all independent

7   variables is less than 10, hence there is no multicollinearity.

8   o   A heteroscedasticity test. There are 2 variables (X25 and X5) that have a Sig value. <0.05,

9   which indicates that heteroscedasticity occurs, then the two variables are excluded.

10   o   A linearity test. From the test results, there are 4 variables (X4, X9, X11, X14) that have

11   Deviation from Linearity Sig values. <0.05, which indicates that there are no significant

12   linear correlations, then these variables are excluded.

13

14   **4.3 Multiple Linear Regression**

15   To determine the performance factors of the online learning process that influence

16   learning effectiveness, multiple regression analysis was used. The average of the efficacy of the

17   online learning process is utilized as the dependent variable in Table 3, while the 22

18   performance characteristics for the online learning process are used as independent variables in

19   Table 2.

20   The effect of the independent variables together on the dependent variable is carried out

21   by conducting a simultaneous significant test (F test), with the following hypothesis

22   formulation:

23   H_0: The regression coefficient is not significant

24   H_1: The regression coefficient is significant

25

26   The level of significance (α) used is 5%.

27

28   Decision-making criteria:

29   Reject H_0 if the significance value < 0.05

30   Accept H_0 if the significance value > 0.05

31

32   Based on the processing results, the value of Sig. of 0.000 (<0.05), so the decision is to

33   reject H_0. This means that the regression coefficient is significant, so the performance of the

34   online learning process has a significant effect on the effectiveness of learning.

1   The effect of each independent variable on the dependent variable is carried out by

2   performing a partial significant test (T-test) with the following hypothesis formulation:

3

4   H_0: the online learning process performance variable does not affect the effectiveness of online

5   learning

6   H_1: the online learning process performance variable does affect the effectiveness of online

7   learning

8

9   Based on the results of processing, the values of Sig X19, X7, and X20 are less than 0.025, then

10   declared to have a significant effect on the dependent variable, with the regression equation:

11

12   Y = 0.011 + 0.388 X19 + 0.249 X7 + 0.308 X20   (3)

13

14   Information :

15   Y   = effectiveness of online learning

16   0.011 = constant

17

18   Three variables have a direct impact on how successful online learning is, according to

19   the multiple regression study. These factors can account for up to 50.2% of the efficiency of

20   online learning (shown by the adjusted R2 value). This shows that 49.8% are still excluded and

21   provides a chance for more study. The dependent variable and independent variable have a

22   significant positive relationship as indicated by multiple correlation values (R) of 0.723. These

23   three influencing factors may be taken into account to increase the efficiency and efficacy of

24   online learning.

25

26   **4.4 Cross Tabulation Analysis (Crosstab)**

27   Seventy-five students from the 2017–2020 academic year completed the questionnaire; their

28   profiles are depicted in Figure 2. As a probability value of 0.809>0.05, there is no correlation

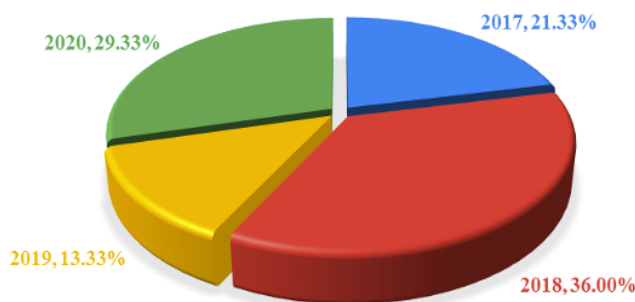29   between the class and the efficiency of online learning.

Figure 2. Class Pie Chart

The proportion of the GPA of students who fill out the questionnaire is shown in Figure 3. Cross-tabulation analysis was performed between this data and the effectiveness of online learning, which yielded the χ^2 probability value of 0.451>0.05. That means that there is no correlation between them.
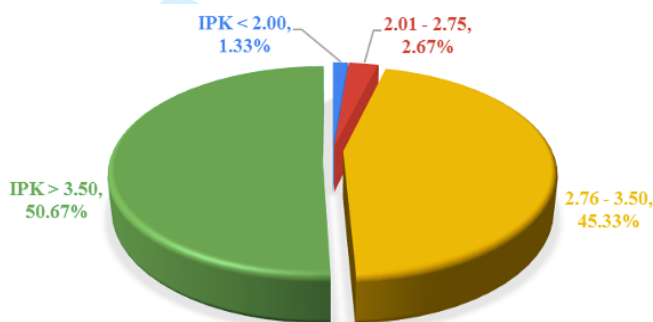

Figure 3. GPA (IPK) Pie Chart

Figure 4 depicts the online learning media chosen by students. Video conference is the most popular. The χ^2 with the online learning efficacy was 0.48>0.05. This demonstrates that there is no correlation between them.
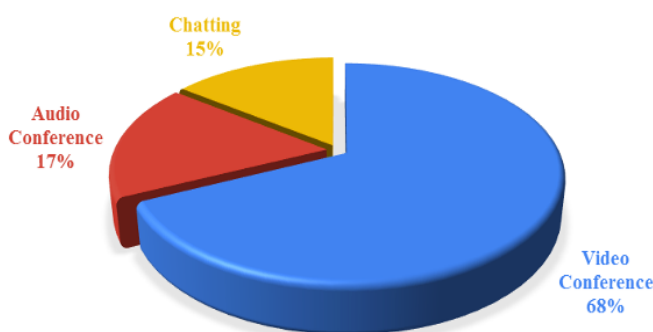

Figure 4. Preferred Media Pie Chart

As shown in Table 4, the factors X19, X7, and X20 that the multiple regression analysis indicated had an impact were used in the cross-tabulation to determine whether there were variations in effectiveness across classes. Only X7 (ease of working in groups) of these factors indicates a difference between groups (probability value: 0.04–0.05). Because they have not had much time to get to know one another, new students who are required to work in groups online face more challenges. Students who have been in college for two to three years have no or little challenges because they already know one another, but students who have just started their second year are still having some difficulty.

Table 4. The results of the cross-tabulation of influential variables

		X19					X7					X20				
		1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total
C L A S S	**2017**															
	Count	0	2	11	3	16	2	5	6	3	16	1	1	11	3	16
	% of Total	0,0	2,7	14,7	4,0	21,3	2,7	6,7	8,0	4,0	21,3	1,3	1,3	14,7	4,0	21,3
	2018															
	Count	0	4	20	3	27	9	11	6	1	27	0	3	19	5	27
	% of Total	0,0	5,3	26,7	4,0	36,0	12,0	14,7	8,0	1,3	36,0	0,0	4,0	25,3	6,7	36,0
	2019															
	Count	1	1	8	0	10	0	2	8	0	10	0	1	9	0	10
	% of Total	1,3	1,3	10,7	0,0	13,3	0,0	2,7	10,7	0,0	13,3	0,0	1,3	12,0	0,0	13,3
	2020															
	Count	0	2	19	1	22	4	10	6	2	22	0	1	18	3	22
	% of Total	0,0	2,7	25,3	1,3	29,3	5,3	13,3	8,0	2,7	29,3	0,0	1,3	24,0	4,0	29,3
	Total															
	Count	1	9	58	7	75	15	28	26	6	75	1	6	57	11	75
	% of Total	1,3	12,0	77,3	9,3	100,0	20,0	37,3	34,7	8,0	100,0	1,3	8,0	76,0	14,7	100,0
Pearson Chi-Square Asymp. Sig (2-sided)		0,32					0,04					0,64				

4.5 SWOC Analysis

According to the findings of a study on change implementation efforts, institutions look for the most suitable online learning platform when there are rapid changes. Trial and error were used to conduct this search. The most appropriate and effective platform can eventually be identified. The LMS and online learning platforms are quickly mastered by lecturers, who subsequently turn their lectures into videos or narrated slides and deposit them there. Additionally, instructors strive to make their lectures as effective as in-person instruction. Additionally, the platform and LMS had to be learned by the students, and they had to adjust to

1 any new procedures that emerged. The college promotes online learning by creating different

2 policies and providing a more adequate LMS.

3 The SWOC analysis was performed to determine the strengths, weaknesses,

4 opportunities, and challenges associated with the present online learning process. The study

5 was based on the value and efficacy of online learning, as well as the findings of multiple linear

6 regression analysis. Classification of value quality is carried out based on the established criteria

7 as shown in Table 5.

8

9 Table 5. Quality Criteria

Range	Quality
$1 \leq$ value < 1.75	Very bad
$1.75 \leq$ value < 2.5	Bad
$2.5 \leq$ value < 3.25	Good
$3.25 \leq$ value ≤ 4	Very good

10

11

12 **4.5.1 Strength**

13 The average score of online learning performance is 2.93 (good). This can be seen as a

14 strength. However, the overall achievement of the variables is still far from the maximum value,

15 so there is still an opportunity for improvement.

16 In terms of the X5 variable, the findings of the interviews with students and instructors

17 show that online lectures are implemented 50% more promptly than face-to-face lectures. First,

18 concerning the X22 variable, the LMS has not been actively socialized or emphasized as a tool

19 for learning source materials for face-to-face interaction. But in the second semester, instructors

20 and students received training on how to utilize it. The creation of learning resources suitable

21 for online courses and their availability on a student-accessible LMS were prerequisites for

22 lecturers.

23 Variables X1, X3, X4, X6, X16, X17, X20, and X24 gain scores above 3, which means

24 that they are considered very good by students. The learning materials have been specifically

25 designed for online learning. Lecturers have studied technology and media related to online

26 learning so that online learning can be carried out properly. On the other hand, administrative

27 officers are also prepared to support online learning implementation.

28

29 **4.5.2 Weaknesses**

Based on student assessments, there is a variable that is considered bad, namely X7. One of the important things for Industrial Engineering graduates is to be able to work in groups. Therefore, many activities are conducted in group work to learn to lead, be led, communicate, relate, make decisions together, resolve conflicts, etc. Working in a group is uncomfortable for students, especially new ones since the learning must be done entirely online. Since group projects were a regular part of in-person lectures, this surprised the students. They complain about the hefty quota fees, the unavailability of gadgets, and the fact that the students did not know each other yet. Additionally, because group members occasionally engage in other activities, the dynamics of the workgroup are occasionally restricted.

4.5.3   Opportunity

The effectiveness of online learning led to the possibility of hybrid or online learning in the future. Because instructors produced learning materials and consistently uploaded them to the LMS, some students can even achieve superior results while learning online. Although it is still a required LMS from the government, SPADA is still mandatory, with superior and more efficient. The information is freely accessible to the students, who may then discuss it with the lecturers.

By proving that online learning was effective and also becoming support for universities in Indonesia to conduct MBKM. The MBKM program is supported because:

1. Students can take lessons in far locations.
2. Allow the university to collaborate with other parties, for example, micro, small, and medium enterprises (MSMEs) to be involved in lectures and businesses.
3. University can outreach students in remote areas.
4. Cooperation with overseas universities can easily be accommodated.

4.5.4 Challenges

In contrast to the opportunities previously outlined, several obstacles materialized. On the student side, signal, quota, and gadget availability are issues that many students encounter. The third issue is that students' eye health is impacted due to prolonged and frequent usage of gadgets (such as Mohan, Sen, Shah, Jain, & Jain, 2021; Pachiyappan et al., 2021). Next, issues related to motivational issues arise. The informal learning environment at home makes learning less efficient. The last difficulty is the tension that students undergo since they are unable to socialize and communicate with peers.

1   For lecturers, online learning is tough because they must quickly create relevant learning

2   materials, and develop ways to conduct lectures while missing out on interaction with students.

3   While the challenge for the study program is to design practicums so that they can be done

4   online, rather than in a laboratory where students get experience by doing experiments.

5   Online learning has the potential to replace or mix with the traditional classroom in the

6   future, given its advantages, strengths, and effectiveness. With the shortcomings and difficulties

7   come the need to solve them, particularly for Indonesian universities that must swiftly switch

8   from in-person to online instruction. There are other options, including:

9   1. To carry out group assignments, lecturers must provide a time slot. Students get clarity of

10   time and lecturers can supervise them.

11   2. Planning synchronous learning, and assignments in ways that improve relations between

12   students, for example by holding games, providing time to chat together, et cetera.

13   3. Allocate funds to help students who are less well off financially. With online learning, the

14   university's operational costs have decreased. These cost savings should be diverted to help

15   students in need of online learning support equipment.

16   4. Create work units to help lecturers prepare learning materials, such as making interesting

17   learning videos, presentation slides, etc.

18   5. The study program is exploring creating a virtual reality laboratory so that students can still

19   get an experience like in a laboratory.

20   These concepts can be used in locations or nations other than Indonesia that have comparable

21   settings and situations.

22

5. Conclusion

24   Online education has become essential as a result of the COVID-19 epidemic. The

25   unexpected necessity to perform online learning caused some distress and misunderstanding at

26   the beginning of the epidemic, but these issues may eventually be handled. However, online

27   learning has proven to be a challenge for students, lecturers, study programs, and administrative

28   personnel. Online and hybrid education can then be alternatives to learning methods.

29   Inadvertently, the epidemic that forces online learning speeds up the use of digital

30   technologies in the classroom. The employment of digital technology in online learning can be

31   advantageous for the Indonesian government's MBKM, international, and outreach activities.

32   Further study may be focused on searching for other variables that impact learning

33   effectiveness as the variables discovered can only account for 50.2% of the variance in learning

34   efficiency. More research may be conducted by reassessing the learning efficacy once the online

learning system has been improved and put into use. Additional research may be done to
examine certain student difficulties including motivation, well-being, and stress levels.

Conflict of Interest

The authors declare no conflict of interest

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11

EFFECTIVENESS OF ONLINE LEARNING IN NON-ONLINE CLASSES DURING THE PANDEMIC

Abstract

The COVID-19 pandemic that has been going on since the beginning of 2020 has forced governments to take a policy to implement online learning. This policy is an effort to break the chain of virus spread in education clusters. For schools and universities that are not used to carrying out online learning, this condition is a problem. Therefore, measurement is needed to ensure effectiveness. In this study, the effectiveness was measured using the variables specified in the Indonesian Online Learning System (Sistem Pembelajaran Daring (SPADA)) 2019 set by the Indonesian government. Data collection was carried out by quantitative and qualitative methods. Quantitative analysis was carried out through questionnaires administered to students while qualitative was carried out by interviewing students and lecturers. The data was processed using cross-tabulation analysis and multiple linear regression. Strengths, Weaknesses, Opportunities, and challenges were analyzed to assess online learning. As research results, it is found that online learning is quite effective, but there are still many things that can be improved to increase the effectiveness of online learning.

Keywords: *COVID-19, effectiveness, online learning, SWOC, university*

1. Introduction

The Coronavirus disease 2019 (COVID-19) was a problem faced by almost all countries in the world. With the severity of the consequences caused by COVID-19, the governments of countries have taken actions, such as imposing large-scale social restrictions and lockdowns.

Indonesia is a country in Southeast Asia, which has also been affected by the COVID-19 pandemic. Therefore, the Indonesian government has also taken large-scale social distancing. Face-to-face meetings and activities of students were prohibited in colleges and universities. Activities for all students are now conducted online. Initially, staff and lecturers were still permitted to conduct activities on campus or at school, but after a certain amount of time, the campus was completely shut down. (Ministry of Higher Education of the Republic of Indonesia, 2020). This decision was unexpected and presented challenges for classes that had been doing face-to-face learning (non-online learning) before the pandemic.

This shift made the institutions worried about whether the learning process was as effective as face-to-face learning. This is a problem since the institution never used online learning; as a result, there are no supporting guidelines, and no ready-to-use equipment and neither the lecturers nor the students have the necessary abilities to deal with it.

X University's Industrial Engineering Study Program is one study program that initially uses non-online learning methods. This study program's learning method suddenly needs to

change to online learning. There is a need to research how successful online learning is and how institutions and teachers prepare for this abrupt transformation in light of all the limitations and challenges. This research utilized the study program in question as a case under such circumstances.

Various studies have been carried out on the effectiveness of online learning, both for classes that are indeed conducted online (such as Buttner & Black, 2014; Means, Toyama, Murphy, & Baki, 2013), as well as classes that were originally non-online but were forced to go online (such as Agarwal & Dewan, 2020; Baber, 2022; Satyawan, Wahjoedi, & Swadesi, 2021). Research has also been carried out to identify barriers to the effectiveness of online learning, (such as Heng & Sol, 2021; Ramli, Majid, & Badyalina, 2020) and the positive outcomes resulting from online learning (Lorenzetti, 2013; Nguyen, 2015). Some studies compare online learning with non-online learning methods (such as Chang, Wang, Lin, Cheng, & Chiang, 2021; Darkwa & Antwi, 2021).

Even though there have been numerous studies on online learning, research on the effectiveness of online learning for initially non-online classes is still scarce. Additionally, neither publications discussing how the institution made this abrupt transition nor studies on the efficiency of online learning based on the five components of the government-mandated Indonesian Online Learning System (*Sistem Pembelajaran Daring (SPADA)*) could be discovered. This study helps evaluate the efficacy of online learning that is implemented abruptly, figuring out how to make it better, and knowing how efforts are being made for this improvement.

2. Literature Review

Several researchers have proven that online learning classes opened are effectively conducted learning processes (Buttner & Black, 2014; Means et al., 2013; Nguyen, 2015). Some researchers have found the positive things obtained from online learning, namely cost-effective implementation, ease to form world-class (Lorenzetti, 2013), enhances better students' test scores and access to learning materials, improves learning perceptions, reduces failures, and improved relations between students (Nguyen, 2015).

However, institutions in Indonesia were obliged to switch from face-to-face study to online learning almost immediately. This occurred unexpectedly, and no plans for online

1
2
3　learning had been established. Considering the implementation of online learning which is very
4
5
6　different from face-to-face learning, there are concerns about online learning's effectiveness.

7　　　　　Research has been carried out before by several researchers and it is found that online
8
9　learning is effective (Agarwal & Dewan, 2020; Baber, 2022; Satyawan et al., 2021; Suprianto
10
11　et al., 2020), However, research on the efforts undertaken to effect change is still limited. On
12
13　the other hand, other academics point out challenges with online learning, including lack of
14
15　digital skills, socioeconomic variables, workload, evaluation and supervision, and
16
17　incompatibility with certain courses (Heng & Sol, 2021). Other researchers find that online
18
19　learning is boring, unengaging, needs personal attention, lack practical experience (Dhawan,
20
21　2020), and causes stress for students (Argaheni, 2020). However, no article was found using
22
23　the five aspects of the SPADA.

24　　　　　SPADA is a program of the Indonesian government to increase equitable access to quality
25
26　learning in Higher Education" (Sekretariat Direktorat Jenderal Pendidikan Tinggi Kementrian
27
28　Pendidikan dan Kebudayaan, 2015). SPADA was designed to support Independent Learning
29
30　Independent Campus called MBKM sets up by the Indonesian government. This MBKM
31
32　encourages students to learn outside of the classroom, whether on the campuses of other
33
34　institutions, corporations, or even in the community.

3. Methodology

As described earlier, the assessment of online learning performance is carried out based
on 5 aspects of *SPADA*. The five aspects of the performance consist of:

• Lesson plan

• Learning Activities

• Delivery/delivery strategy

• Learning media and technology

• Study assistance services

The Likert scale was employed as shown in Table 1 to evaluate the elements and efficacy. As
shown in Table 2, these five factors are applied to 28 variables. A questionnaire is created using
these factors. While four criteria are used to evaluate the efficacy of online learning, as shown
in Table 3.

1

Table 1. Likert Scale

Score weight	4	3	2	1
Performance Rate	Strongly Agree	Agree	Disagree	Strongly Disagree
Effectivity	Strongly Agree	Agree	Disagree	Strongly Disagree

Table 2. Online learning performance

Var. No.	Variable statements	Score
X1	Online learning materials are oriented towards student independence	3.19
X2	Online learning materials emphasize student creativity and innovation in learning	3
X3	Online learning materials are arranged systematically	3.01
X4	Online learning materials are in accordance with the predetermined learning plan	3.08
X5	Online learning is carried out according to a predetermined schedule	3.25
X6	It is easy to collect assignments/reports online	3.12
X7	Online group work can be done easily	2.31
X8	Presentation of assignments online is easy	2.91
X9	The online exam process can be done easily	2.89
X10	The process of monitoring and evaluating online learning can guarantee the quality of learning	2.64
X11	The online learning plan for one semester is clearly conveyed at the beginning of the lecture	3
X12	Online learning materials are presented in an interesting way	2.75
X13	Online learning materials are delivered clearly	2.89
X14	The interaction between lecturers and students in online learning takes place actively	2.81
X15	Delivery of online learning materials (lectures/practicum) facilitates students to learn actively (practice questions, case studies, discussions)	2.99
X16	Lecturer / Assistant has an adequate level of technology and media mastery	3.12
X17	Lecturers always accompany during online learning	3.03
X18	Feedback from lecturers in online learning can be used by students to better understand the lecture material	2.99
X19	Online learning provides an opportunity to reflect on material understanding through self-assessment	2.95
X20	The characteristics of the material delivered are in accordance with the online learning media used	3.04
X21	Easy-to-use online learning platform	2.93
X22	Online learning media (Whatsapp, Line, Google Meet, Zoom, etc.) can be used easily	3.29
X23	Online learning materials can be downloaded easily	3.24
X24	Administration provides administrative service support during online learning	3.08
X25	Lecturers provide support in overcoming difficulties in online learning	3
X26	Information about student learning progress and success can be accessed easily in online learning	3
X27	Study Program provides a means of submitting input/complaints for students related to online learning	2.97
X28	Internet quota is always available when participating in online learning	2,83
	Average	**2.93**

Seventy-five Industrial Engineering students from the Class of 2017–2020 were given surveys to complete using Google Forms. The survey asks about student characteristics as well as the usefulness and performance of online learning.

Table 3. Online learning performance effectiveness

Var. No.	Variable statements	Score
Y1	Online learning improves my understanding of course material	2,52
Y2	Online learning increases my motivation to study	2,43
Y3	Online learning increases my independence in learning	2,99
Y4	Online learning increases my opportunities to actively participate in learning activities	2,72
	Average	**2.66**

Multiple linear regression was used to examine the effectiveness of online learning and performance evaluation. The SWOC analysis was then carried out based on the outcomes of the multiple linear regression and the cross-tabulation analysis. Five students, three professors, and three university administrators were interviewed as part of studies on how institutions adopt change. The suggestion for improvement was based on the SWOC study. The research was conducted following the Figure 1 flow diagram.
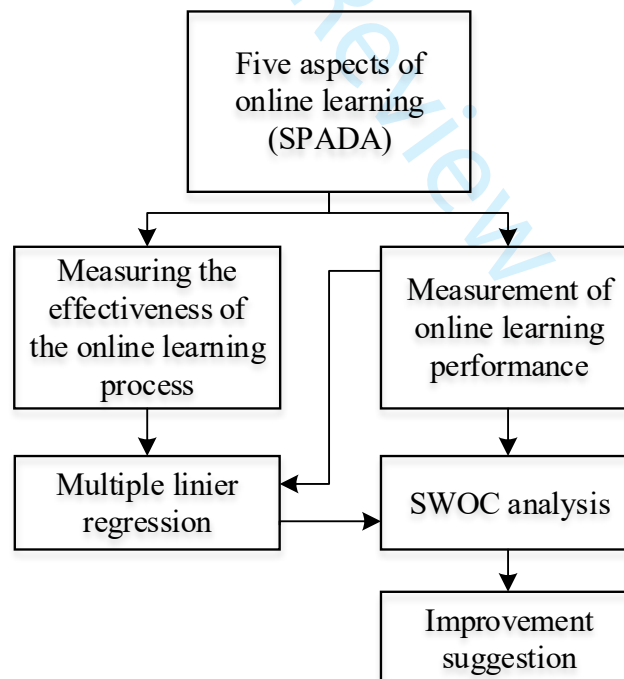

Figure 1. Research flow

1   Measurement of online learning performance is carried out using the following formula:

$$\bar{X} = \frac{\sum_{i=1}^{k} X_i}{n} \qquad (1)$$

2   where:

3   $\bar{X}$ = average score of performance level

4   X_i = the score of ith respondent's performance level

5   n = number of respondents

6   To find out the online learning performance variables that affect the effectiveness, the

7   multiple linear regression method is used with the following equation:

8

$$Y = a + b_1X_1 + b_2X_2 \dots + b_nX_n \qquad (2)$$

9   where:

10   Y = online learning process effectivity

11   $X_1, X_2, \dots, X_n$ =   online learning performance variables

12   a = constant

13   $b_1, b_2, \dots, b_n$ = regression coefficient

14

15   SWOC analysis can be used to analyze strengths, weaknesses, opportunities, and

16   challenges (Dhawan, 2020). Interviews with both students and lecturers were performed as part

17   of the SWOC study. Based on all the data acquired, improvement ideas were developed.

18

19   **4. Result and Discussion**

20   The results of the questionnaires filled out by respondents, namely students of the

21   Industrial Engineering Study Program can be seen in Table 2 and Table 3.

22

23   **4.1 Validity and Reliability Test**

24   The measurement device's accuracy was validated by the validity test. All construct scores

25   were legitimate since they were positively correlated with the overall question score (count r

26   value > r table value). The accuracy of the measurement instrument was examined using the

27   Cronbach Alpha (α) statistical test. Both questionnaires' scores—0.915 for the learning process

28   performance evaluation questionnaire and 0.845 for the learning effectiveness assessment

29   questionnaire—indicate their reliability.

30

31

1 **4.2 Classic Assumption Test**

2 Classical assumption tests need to be carried out to ensure the validity of the use of multiple

3 linear regression, which consists of:

4 o   The normality test. The significant value Asym. Sig. (2-tailed) of 0.842>0.05, indicating

5   that the data is normally distributed.

6 o   The multicollinearity test. The value of the variance inflation factor (VIF) of all independent

7   variables is less than 10, hence there is no multicollinearity.

8 o   A heteroscedasticity test. There are 2 variables (X25 and X5) that have a Sig value. <0.05,

9   which indicates that heteroscedasticity occurs, then the two variables are excluded.

10 o   A linearity test. From the test results, there are 4 variables (X4, X9, X11, X14) that have

11   Deviation from Linearity Sig values. <0.05, which indicates that there are no significant

12   linear correlations, then these variables are excluded.

13

14 **4.3 Multiple Linear Regression**

15   To determine the performance factors of the online learning process that influence

16 learning effectiveness, multiple regression analysis was used. The average of the efficacy of the

17 online learning process is utilized as the dependent variable in Table 3, while the 22

18 performance characteristics for the online learning process are used as independent variables in

19 Table 2.

20   The effect of the independent variables together on the dependent variable is carried out

21 by conducting a simultaneous significant test (F test), with the following hypothesis

22 formulation:

23 H_0: The regression coefficient is not significant

24 H_1: The regression coefficient is significant

25

26 The level of significance (α) used is 5%.

27

28 Decision-making criteria:

29 Reject H_0 if the significance value < 0.05

30 Accept H_0 if the significance value > 0.05

31

32   Based on the processing results, the value of Sig. of 0.000 (<0.05), so the decision is to

33 reject H_0. This means that the regression coefficient is significant, so the performance of the

34 online learning process has a significant effect on the effectiveness of learning.

1   The effect of each independent variable on the dependent variable is carried out by

2   performing a partial significant test (T-test) with the following hypothesis formulation:

3

4   H_0: the online learning process performance variable does not affect the effectiveness of online

5   learning

6   H_1: the online learning process performance variable does affect the effectiveness of online

7   learning

8

9   Based on the results of processing, the values of Sig X19, X7, and X20 are less than 0.025, then

10   declared to have a significant effect on the dependent variable, with the regression equation:

11

12   Y = 0.011 + 0.388 X19 + 0.249 X7 + 0.308 X20   (3)

13

14   Information :

15   Y   = effectiveness of online learning

16   0.011 = constant

17

18   Three variables have a direct impact on how successful online learning is, according to

19   the multiple regression study. These factors can account for up to 50.2% of the efficiency of

20   online learning (shown by the adjusted R2 value). This shows that 49.8% are still excluded and

21   provides a chance for more study. The dependent variable and independent variable have a

22   significant positive relationship as indicated by multiple correlation values (R) of 0.723. These

23   three influencing factors may be taken into account to increase the efficiency and efficacy of

24   online learning.

25

26   **4.4 Cross Tabulation Analysis (Crosstab)**

27   Seventy-five students from the 2017–2020 academic year completed the questionnaire; their

28   profiles are depicted in Figure 2. As a probability value of 0.809>0.05, there is no correlation

29   between the class and the efficiency of online learning.
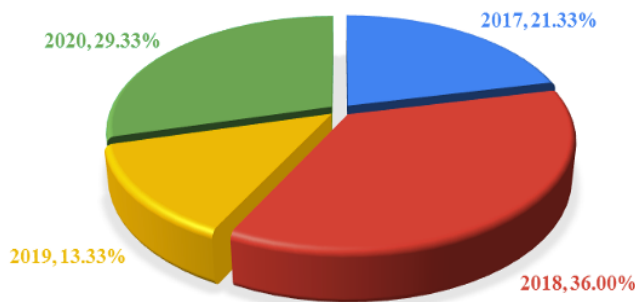
Figure 2. Class Pie Chart

The proportion of the GPA of students who fill out the questionnaire is shown in Figure 3. Cross-tabulation analysis was performed between this data and the effectiveness of online learning, which yielded the χ^2 probability value of 0.451>0.05. That means that there is no correlation between them.
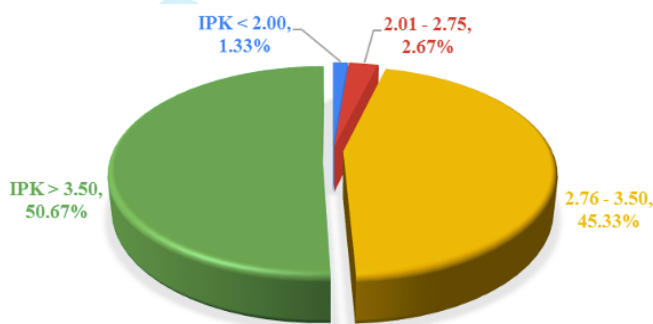

Figure 3. GPA (IPK) Pie Chart

Figure 4 depicts the online learning media chosen by students. Video conference is the most popular. The χ^2 with the online learning efficacy was 0.48>0.05. This demonstrates that there is no correlation between them.
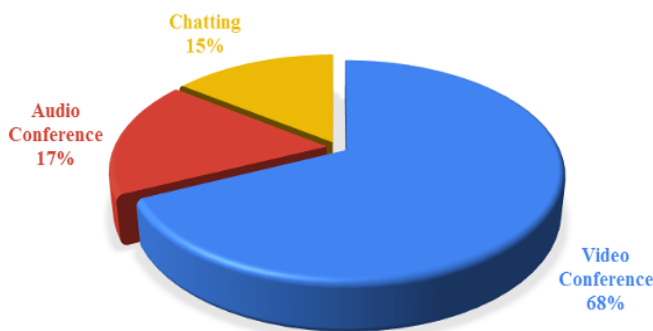

Figure 4. Preferred Media Pie Chart

9

1   As shown in Table 4, the factors X19, X7, and X20 that the multiple regression analysis

2 indicated had an impact were used in the cross-tabulation to determine whether there were

3 variations in effectiveness across classes. Only X7 (ease of working in groups) of these factors

4 indicates a difference between groups (probability value: 0.04–0.05). Because they have not

5 had much time to get to know one another, new students who are required to work in groups

6 online face more challenges. Students who have been in college for two to three years have no

7 or little challenges because they already know one another, but students who have just started

8 their second year are still having some difficulty.

9

10   Table 4. The results of the cross-tabulation of influential variables

			X19					X7					X20			
			1	2	3	4	Total	1	2	3	4	Total	1	2	3	4	Total
	2017																
	Count		0	2	11	3	16	2	5	6	3	16	1	1	11	3	16
	% of Total		0,0	2,7	14,7	4,0	21,3	2,7	6,7	8,0	4,0	21,3	1,3	1,3	14,7	4,0	21,3
	2018																
	Count		0	4	20	3	27	9	11	6	1	27	0	3	19	5	27
C	% of Total		0,0	5,3	26,7	4,0	36,0	12,0	14,7	8,0	1,3	36,0	0,0	4,0	25,3	6,7	36,0
L	**2019**																
A	Count		1	1	8	0	10	0	2	8	0	10	0	1	9	0	10
S	% of Total		1,3	1,3	10,7	0,0	13,3	0,0	2,7	10,7	0,0	13,3	0,0	1,3	12,0	0,0	13,3
S	**2020**																
	Count		0	2	19	1	22	4	10	6	2	22	0	1	18	3	22
	% of Total		0,0	2,7	25,3	1,3	29,3	5,3	13,3	8,0	2,7	29,3	0,0	1,3	24,0	4,0	29,3
	Total																
	Count		1	9	58	7	75	15	28	26	6	75	1	6	57	11	75
	% of Total		1,3	12,0	77,3	9,3	100,0	20,0	37,3	34,7	8,0	100,0	1,3	8,0	76,0	14,7	100,0
Pearson Chi-Square Asymp. Sig (2-sided)			0,32					0,04					0,64				

11

12

4.5 SWOC Analysis

14   According to the findings of a study on change implementation efforts, institutions look

15 for the most suitable online learning platform when there are rapid changes. Trial and error

16 were used to conduct this search. The most appropriate and effective platform can eventually

17 be identified. The LMS and online learning platforms are quickly mastered by lecturers, who

18 subsequently turn their lectures into videos or narrated slides and deposit them there.

19 Additionally, instructors strive to make their lectures as effective as in-person instruction.

20 Additionally, the platform and LMS had to be learned by the students, and they had to adjust to

1   1   any new procedures that emerged. The college promotes online learning by creating different

2   2   policies and providing a more adequate LMS.

3   3   The SWOC analysis was performed to determine the strengths, weaknesses,

4   4   opportunities, and challenges associated with the present online learning process. The study

5   5   was based on the value and efficacy of online learning, as well as the findings of multiple linear

6   6   regression analysis. Classification of value quality is carried out based on the established criteria

7   7   as shown in Table 5.

8

9   Table 5. Quality Criteria

Range	Quality
$1 \leq$ value < 1.75	Very bad
$1.75 \leq$ value < 2.5	Bad
$2.5 \leq$ value < 3.25	Good
$3.25 \leq$ value ≤ 4	Very good

10

11

12   **4.5.1 Strength**

13   The average score of online learning performance is 2.93 (good). This can be seen as a

14   strength. However, the overall achievement of the variables is still far from the maximum value,

15   so there is still an opportunity for improvement.

16   In terms of the X5 variable, the findings of the interviews with students and instructors

17   show that online lectures are implemented 50% more promptly than face-to-face lectures. First,

18   concerning the X22 variable, the LMS has not been actively socialized or emphasized as a tool

19   for learning source materials for face-to-face interaction. But in the second semester, instructors

20   and students received training on how to utilize it. The creation of learning resources suitable

21   for online courses and their availability on a student-accessible LMS were prerequisites for

22   lecturers.

23   Variables X1, X3, X4, X6, X16, X17, X20, and X24 gain scores above 3, which means

24   that they are considered very good by students. The learning materials have been specifically

25   designed for online learning. Lecturers have studied technology and media related to online

26   learning so that online learning can be carried out properly. On the other hand, administrative

27   officers are also prepared to support online learning implementation.

28

29   **4.5.2 Weaknesses**

Based on student assessments, there is a variable that is considered bad, namely X7. One of the important things for Industrial Engineering graduates is to be able to work in groups. Therefore, many activities are conducted in group work to learn to lead, be led, communicate, relate, make decisions together, resolve conflicts, etc. Working in a group is uncomfortable for students, especially new ones since the learning must be done entirely online. Since group projects were a regular part of in-person lectures, this surprised the students. They complain about the hefty quota fees, the unavailability of gadgets, and the fact that the students did not know each other yet. Additionally, because group members occasionally engage in other activities, the dynamics of the workgroup are occasionally restricted.

4.5.3   Opportunity

The effectiveness of online learning led to the possibility of hybrid or online learning in the future. Because instructors produced learning materials and consistently uploaded them to the LMS, some students can even achieve superior results while learning online. Although it is still a required LMS from the government, SPADA is still mandatory, with superior and more efficient. The information is freely accessible to the students, who may then discuss it with the lecturers.

By proving that online learning was effective and also becoming support for universities in Indonesia to conduct MBKM. The MBKM program is supported because:

1. Students can take lessons in far locations.
2. Allow the university to collaborate with other parties, for example, micro, small, and medium enterprises (MSMEs) to be involved in lectures and businesses.
3. University can outreach students in remote areas.
4. Cooperation with overseas universities can easily be accommodated.

4.5.4 Challenges

In contrast to the opportunities previously outlined, several obstacles materialized. On the student side, signal, quota, and gadget availability are issues that many students encounter. The third issue is that students' eye health is impacted due to prolonged and frequent usage of gadgets (such as Mohan, Sen, Shah, Jain, & Jain, 2021; Pachiyappan et al., 2021). Next, issues related to motivational issues arise. The informal learning environment at home makes learning less efficient. The last difficulty is the tension that students undergo since they are unable to socialize and communicate with peers.

1　　For lecturers, online learning is tough because they must quickly create relevant learning

2　materials, and develop ways to conduct lectures while missing out on interaction with students.

3　While the challenge for the study program is to design practicums so that they can be done

4　online, rather than in a laboratory where students get experience by doing experiments.

5　　Online learning has the potential to replace or mix with the traditional classroom in the

6　future, given its advantages, strengths, and effectiveness. With the shortcomings and difficulties

7　come the need to solve them, particularly for Indonesian universities that must swiftly switch

8　from in-person to online instruction. There are other options, including:

9　1. To carry out group assignments, lecturers must provide a time slot. Students get clarity of

10　　time and lecturers can supervise them.

11　2. Planning synchronous learning, and assignments in ways that improve relations between

12　　students, for example by holding games, providing time to chat together, et cetera.

13　3. Allocate funds to help students who are less well off financially. With online learning, the

14　　university's operational costs have decreased. These cost savings should be diverted to help

15　　students in need of online learning support equipment.

16　4. Create work units to help lecturers prepare learning materials, such as making interesting

17　　learning videos, presentation slides, etc.

18　5. The study program is exploring creating a virtual reality laboratory so that students can still

19　　get an experience like in a laboratory.

20　These concepts can be used in locations or nations other than Indonesia that have comparable

21　settings and situations.

22

5. Conclusion

23

24　　Online education has become essential as a result of the COVID-19 epidemic. The

25　unexpected necessity to perform online learning caused some distress and misunderstanding at

26　the beginning of the epidemic, but these issues may eventually be handled. However, online

27　learning has proven to be a challenge for students, lecturers, study programs, and administrative

28　personnel. Online and hybrid education can then be alternatives to learning methods.

29　　Inadvertently, the epidemic that forces online learning speeds up the use of digital

30　technologies in the classroom. The employment of digital technology in online learning can be

31　advantageous for the Indonesian government's MBKM, international, and outreach activities.

32　　Further study may be focused on searching for other variables that impact learning

33　effectiveness as the variables discovered can only account for 50.2% of the variance in learning

34　efficiency. More research may be conducted by reassessing the learning efficacy once the online

learning system has been improved and put into use. Additional research may be done to examine certain student difficulties including motivation, well-being, and stress levels.

Conflict of Interest

The authors declare no conflict of interest

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12-Dec-2022

Dear Dr. Wirawan:

Your revised manuscript entitled "EFFECTIVENESS OF ONLINE LEARNING IN NON-ONLINE CLASSES DURING THE PANDEMIC" has been successfully submitted online and is presently being given full consideration for publication in Management in Education.

Your manuscript ID is MIE-22-042.R2.

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Thank you for submitting your manuscript to Management in Education.

Sincerely,
Paul Armstrong
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mieeditors@gmail.com

9. Letter of Acceptance 23-1-2022

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Christina Wirawan <christina.wirawan@eng.maranatha.edu>
Mon 1/23/2023 5:36 PM
To:Yulianti <yulianti@eng.maranatha.edu>;Jimmy Gozaly <jimgozaly@yahoo.com>

Horeeeee
Thank u all

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Sent: Monday, January 23, 2023 4:57 PM
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Subject: Management in Education - Decision on Manuscript ID MIE-22-042.R2

23-Jan-2023

Dear Christina,

I am delighted to inform you that we have decided to accept your manuscript entitled "EFFECTIVENESS OF ONLINE LEARNING IN NON-ONLINE CLASSES DURING THE PANDEMIC" for publication in Management in Education. The comments of the reviewer(s) who considered your manuscript are included at the foot of this letter.

Thank you for your contribution to Management in Education and I look forward to your future contributions to the Journal.

Following acceptance of your article, we would be delighted if you would contribute a short blog post on the essence of your article to the BELMAS Blog to info@belmas.org.uk. This will ensure that your article is widely circulated and encourages more readers. You can find guidelines for submission here https://www.belmas.org.uk/BELMAS-Blog.

Best wishes,

Dr. Paul Armstrong
Management in Education
Paul.Armstrong@manchester.ac.uk

Reviewer(s)' Comments to Author:

Reviewer: 2

Comments to the Author
Thank you for persevering with this manuscript. I have enjoyed reading your work and following up your literature review.

10. Permintaan mengisi contributor form 23-1-2023

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11. Permintaan proofing 15-12-2023

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Jimmy, Yuli...
Ini final proof kita, barangkali ada perubahan atau kesalahan ya... sy juga akan cek.
Sorry, ini harus hari ini, soalnya kemaren lupa ga buka email

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Manuscript DOI:	10.1177/08920206231157509
Journal:	Management in Education

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Ramdas Bhat
mie_sagepub@novatechset.com

EFFECTIVENESS OF ONLINE LEARNING IN NON-ONLINE CLASSES DURING THE PANDEMIC

Jimmy Gozaly, Yulianti Talar (https://orcid.org/0000-0002-8552-1715), Christina Wirawan(https://orcid.org/0000-0003-4273-7820)*, Axel Varian Kurniawan
Industrial Engineering Department, Maranatha Christian University
Email: jimmy.gozaly@eng.maranatha.edu, yulianti@eng.maranatha.edu, christina.wirawan@eng.maranatha.edu, alexkurniawan345@gmail.com
*corresponding author

Abstract

The COVID-19 pandemic that has been going on since the beginning of 2020 has forced the Indonesian government to take a policy to implement online learning for all schools and universities in Indonesia. This policy is an effort to break the chain of virus spread in education clusters while protecting the public from the transmission of the COVID-19 virus. For schools and universities that are not used to carrying out online learning, this condition is a problem in itself. Therefore, measurement is needed to ensure the effectiveness of online learning that is implemented. In this study, the effectiveness of online learning will be measured using the variables specified in the Online Learning Process Guidelines called the Indonesian Online Learning System (SPADA) 2019 set by the Indonesian government. Data collection was carried out by quantitative and qualitative methods. Quantitative analysis was carried out through questionnaires given to students and processed using cross-tabulation analysis, and multiple linear regression, while qualitative was carried out by interviewing students and lecturers. Analysis of the SWOC method (Strengths, Weaknesses, Opportunities, Challenges) analysis was carried out to assess online learning based on the results of data collection. From the research results, it is known that learning is quite effective, but there are still many things that can be improved to increase the effectiveness of online learning.

Keywords: *COVID-19, effectiveness, online learning, SWOC*

1. Introduction

Coronavirus disease 2019 (COVID-19) is a problem that is currently being faced by almost all countries in the world. The World Health Organization (2020) officially declared the disease a pandemic on March 11, 2020 (WHO, 2020). This virus is very dangerous because it spreads quickly and causes severe effects, especially for the elderly and infected comorbid patients. Countries are quite bothered because hospitals and other health facilities are full. Health workers are also working hard and many have been infected due to treating so many COVID-19 patients. The death toll due to this disease is very high in various countries, both health workers and the community.

With the severity of the consequences caused by COVID-19, the governments of countries have taken various actions. The most popular measures are imposing large-scale social restrictions and lockdowns. With this policy, the community's activities are limited.

Businesses that are not vital are restricted, offices are closed, and community activities outside the home are also restricted. This was done even though it cost the economy for a lot of people and the state, to protect public health. In the field of education, schools and campuses were closed to prevent crowds that could cause COVID-19 transmission. Learning and all activities in schools and campuses are shifted to online activities.

Indonesia is a country in Southeast Asia, which has also been affected by the COVID-19 pandemic. As in other countries, the death toll from COVID-19 in Indonesia is quite high. Therefore, the Indonesian government has also taken large-scale social distancing measures. Many companies and offices have to be closed or have limited hours of operation. In the education sector, the Indonesian government has imposed long-distance restrictions and forbade schools and universities from holding face-to-face meetings. Especially for universities, the distance learning process is strengthened by the Circular of the Director-General of Higher Education of the Republic of Indonesia Number 1 of 2020 concerning Prevention of the Spread of Corona Virus Disease (COVID-19) in Higher Education (Ministry of Higher Education of the Republic of Indonesia, 2020) (Ministry of Higher Education of the Republic of Indonesia, 2020).

This decision was unexpected and presented challenges for classes that had been doing face-to-face learning (non-online learning) before the pandemic. The decision was made on the spur of the moment, due to the rapid spread of COVID-19. Distance learning is unfamiliar to both lecturers and students (online learning). Learning is carried out in this situation using various technological tools such as WhatsApp, Zoom, Google Meet, Skype, MS Teams, and others.

When this research was conducted, distance learning had entered its fourth semester. Currently, lecturers and students are more familiar with online learning methods, and better learning facilities are available, including a capable learning management system that has been built. However, because the class uses non-online learning methods, this change may cause learning to be less effective. Even though it should be carried out using online learning methods, learning must also be effective.

Maranatha Christian University's Industrial Engineering Study Program is one of the study programs that use non-online learning methods. Face-to-face learning takes place in the classroom, laboratory, or studio. However, because of the COVID-19 pandemic, as well as government regulations governing the implementation of online learning, this study program's learning method was changed to online. This study program has been used as a research study

to see how effective online learning is in engineering programs that do not use traditional learning methods.

Various studies have been carried out on the effectiveness of online learning, both for classes that are indeed conducted online (such as Baig, 2011; Buttner & Black, 2014; Means, Toyama, Murphy, & Baki, 2013), as well as classes that were originally non-online but were forced to go online due to the COVID-19 pandemic (Agarwal & Dewan, 2020; Baber, 2022; Satyawan, Wahjoedi, & Swadesi, 2021; Suprianto, Arhas, Mahmuddin, & Siagian, 2020). Research has also been carried out to identify barriers to the effectiveness of online learning (such as Heng & Sol, 2021; Ramli, Majid, & Badyalina, 2020) and the positive outcomes resulting from online learning (Lorenzetti, 2013; Nguyen, 2015). Some studies compare online learning with the non-online learning method (such as Chang, Wang, Lin, Cheng, & Chiang, 2021; Darkwa & Antwi, 2021). Moreover, research is also conducted on the effectiveness of the learning management system (such as Gunawan, Hui, Ma'sum, & Sukawati, 2020; Singh, Sharma, & Paliwal, 2020; Zulfikar et al., 2019).

Despite the fact that there have been numerous studies on online learning, research on the effectiveness of online learning for non-online classes is still scarce. There was also no research on the effectiveness of online learning based on five aspects of the government-mandated Indonesian Online Learning System.

This study is useful for assessing the effectiveness of online learning and determining what can be done to improve it. The effectiveness of the Indonesian Online Learning System, or SPADA, would be determined by five factors.

2. Literature Review

Online learning has been quite popular since the 2000s. Many universities and colleges have opened distance learning, although there is still much debate about its effectiveness. Several researchers have proven that online learning classes opened by various universities and colleges are effectively conducted learning (Baig, 2011; Buttner & Black, 2014; Means et al., 2013; Nguyen, 2015; Shukor, Tasir, & Meijden, 2015).

Some researchers have even researched some of the positive things that are obtained with online classes, namely cost-effective implementation, the possibility to form world-class easily, and credit equalization can be done (Lorenzetti, 2013). For students, online learning enhances better student test scores, students access to learning materials, improves learning perceptions,

reduces student withdrawals and failures, and improves community relations between students (Nguyen, 2015).

The studies mentioned above were done for classes that were meant to be taken online. Thus, technology, platforms, and others, including lecturers and students, have been effectively and appropriately prepared. However, institutions in Indonesia were obliged to switch from face-to-face study in the classroom to online learning almost immediately after the outbreak began. This occurred unexpectedly, and no plans for online learning had been established. The facilities and equipment employed are temporary, and learning materials are quickly altered. Online learning approaches are still trial and error. However, this was necessary for learning to continue throughout the pandemic without increasing the chance of the COVID-19 virus spreading.

The COVID-19 epidemic, which was first expected to be brief, has turned out to be lengthy, therefore online learning will continue until the end of 2021. There have been attempts to create schools and campuses to conduct face-to-face learning, but with limitations on the number of students in a single class, comprehensive medical and online equipment, and very rigorous health procedures. Face-to-face learning is also quite situational; it can be abruptly terminated if any students or instructors are affected by COVID-19, or if the local government or school/campus officials decide to close it.

Regarding the implementation of online learning which is very different from face-to-face learning, there are concerns from the university about the effectiveness of online learning. This concern occurs because although from semester to semester improvements are made in online learning facilities and infrastructure, online learning materials, learning management systems, and lecturers' abilities, online learning has only just been implemented. Research has been carried out by several researchers and it is found that online learning is considered effective (Agarwal & Dewan, 2020; Baber, 2022; Satyawan et al., 2021; Suprianto et al., 2020).

However, some researchers identify obstacles or difficulties that occur with the condition of changing learning methods to online learning. Some of the obstacles or challenges that are commonly faced are technology, digital skills, socio-economic factors, assessment and supervision, workload, and course compatibility (Heng & Sol, 2021). Other researchers find that online learning is boring and unengaging for students, needs personal attention, lacks practical experience (Dhawan, 2020), as well as causes stress for students (Argaheni, 2020). Heng & Sol (2021) also compiled various steps to improve conditions for increasing the

effectiveness of online learning. However, no article was found using the five aspects of the Indonesian Online Learning System, or called SPADA.

"SPADA Indonesia is one of the programs of the Directorate General of Learning and Student Affairs of the Ministry of Research, Technology and Higher Education to increase equitable access to quality learning in Higher Education" (Sekretariat Direktorat Jenderal Pendidikan Tinggi Kementrian Pendidikan dan Kebudayaan, 2015). SPADA Indonesia provides opportunities for students to be able to take courses from other universities and their learning outcomes can be recognized by the college where the student is registered (Sekretariat Direktorat Jenderal Pendidikan Tinggi Kementrian Pendidikan dan Kebudayaan, 2015). SPADA is designed to help the Indonesian government's *Merdeka Belajar Kampus Merdeka* (MBKM) initiative. This MBKM allows students to learn outside of the classroom, whether on the campuses of other institutions, corporations or even in the community.

To make the MBKM program easier to execute, colleges in Indonesia are directing online learning to be linked to SPADA. SPADA highlights the existence of five dimensions of online learning: learning design, learning activities, delivery techniques, learning media, and technology, as well as guidelines for applying online learning support services. (Direktur Jenderal Pembelajaran dan Kemahasiswaan, 2019)

This study uses five features of SPADA as indicators to assess the efficiency of online learning. To analyze the success of online learning, these five criteria are reduced to relevant items that are produced in the form of a questionnaire. The major goal of this study is to use the

Strength, Weakness, Opportunity, and Challenge (SWOC) analysis to improve the efficacy of online learning (Dhawan, 2020).

3. Methodology

As described earlier, the assessment of the effectiveness and performance of online learning in the Industrial Engineering Study Program is carried out based on 5 aspects of SPADA online learning. The five aspects of online learning consist of:

• Lesson plan

• Learning Activities

• Delivery/delivery strategy

• Learning media and technology

• Study assistance services

These five aspects are deployed to 28 variables, as can be seen in table 1. These variables are compiled into a questionnaire and filled out by students as respondents and the data is processed to measure the effectiveness of online learning and online learning performance.

Data collection was carried out by administering questionnaires using Google Forms to Industrial Engineering students Class of 2017-2020. The questionnaire contains questions regarding student profiles, assessment of online learning performance, and effectiveness with variables. The rating scale used is the Likert scale as shown in Table 2.

Table 1. Variables deployment

Var. No.	Variable statements
X1	Online learning materials are oriented toward student independence
X2	Online learning materials emphasize student creativity and innovation in learning
X3	Online learning materials are arranged systematically
X4	Online learning materials are in accordance with the predetermined learning plan
X5	Online learning is carried out according to a predetermined schedule
X6	It is easy to collect assignments/reports online
X7	Online group work can be done easily
X8	Presentation of assignments online is easy
X9	The online exam process can be done easily
X10	The process of monitoring and evaluating online learning can guarantee the quality of learning
X11	The online learning plan for one semester is clearly conveyed at the beginning of the lecture
X12	Online learning materials are presented in an interesting way

X13	Online learning materials are delivered clearly
X14	The interaction between lecturers and students in online learning takes place actively
X15	Delivery of online learning materials (lectures/practicum) facilitates students to learn actively (practice questions, case studies, discussions)
X16	The lecturer / Assistant has an adequate level of technology and media mastery
X17	Lecturers always accompany during online learning
X18	Feedback from lecturers in online learning can be used by students to better understand the lecture material
X19	Online learning provides an opportunity to reflect on material understanding through self-assessment
X20	The characteristics of the material delivered are in accordance with the online learning media used
X21	Easy-to-use online learning platform
X22	Online learning media (Whatsapp, Line, Google Meet, Zoom, etc.) can be used easily
X23	Online learning materials can be downloaded easily
X24	Administration provides administrative service support during online learning
X25	Lecturers provide support in overcoming difficulties in online learning
X26	Information about student learning progress and success can be accessed easily in online learning
X27	Study Program provides a means of submitting input/complaints about students related to online learning
X28	Internet quota is always available when participating in online learning

Tabel 2. Likert Scale

Score weight	4	3	2	1
Performance Rate	Strongly Agree	Agree	Disagree	Strongly Disagree
Effectivity	Strongly Agree	Agree	Disagree	Strongly Disagree

Based on this evaluation, an analysis of factors that influence the efficacy of online learning was conducted to determine the strengths, limitations, opportunities, and difficulties of the present online learning system, which will be used to provide recommendations for improvement. The research was carried out according to the flow diagram in Figure 1.
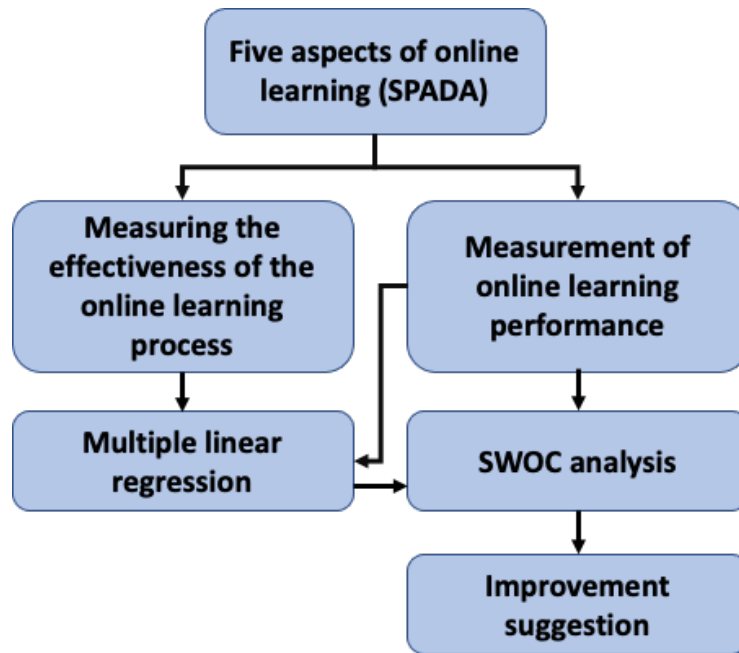
Figure 1. Research flow

Online learning effectivity and online learning performance measurement were done using multiple linear regression. Then, based on multiple linear regression results and cross-tabulation analysis of the respondents' profiles, SWOC analysis was conducted. Based on SWOC analysis then improvement suggestions were established.

Measurement of the level of online learning performance is carried out using the following formula:

$$\bar{X} = \frac{\sum_{i=1}^{k} X_i}{n} \quad\quad (1)$$

where:

$\bar{X}$ = average score of performance level

X_i = the score of ith respondent's performance level

 n = number of respondent

To find out the online learning performance variables that affect its effectiveness, the multiple linear regression method is used. This method is used to analyze the relationship between a dependent variable and several independent variables (Hair, Black, Babin, & Anderson, 2014), with the following equation:

$$Y = a + b_1 X_1 + b_2 X_2 \dots + b_n X_n \quad\quad (2)$$

where:

Y = online learning process effectivity

$X_1, X_2, ..., X_n$= online learning performance variabels

a = constant

$b_1, b_2, ..., b_n$ = regression coefficient

SWOC analysis can be used to analyze strengths, weaknesses, opportunities, and challenges (Dhawan, 2020). In this research, we used it to analyze the result. To do SWOC analysis, interviews were conducted with students and lecturers. In addition, secondary data such as archives, documents, and other information are also used. Based on all information gathered, improvement suggestions were built.

4. Result and Discussion

The results of the questionnaires filled out by respondents, namely students of the Industrial Engineering Study Program can be seen in table 3.

4.1 Validity and Reliability Test

The validity test was performed on the online learning process performance evaluation questionnaire and the online learning effectiveness assessment questionnaire to confirm the accuracy of the measuring instrument used in the study. The overall construct score was

Table 3. The Score for Each Variable Statements

Var. No.	Variable statements	Score
X1	Online learning materials are oriented toward student independence	3.19
X2	Online learning materials emphasize student creativity and innovation in learning	3
X3	Online learning materials are arranged systematically	3.01
X4	Online learning materials are in accordance with the predetermined learning plan	3.08
X5	Online learning is carried out according to a predetermined schedule	3.25
X6	It is easy to collect assignments/reports online	3.12
X7	Online group work can be done easily	2.31
X8	Presentation of assignments online is easy	2.91
X9	The online exam process can be done easily	2.89
X10	The process of monitoring and evaluating online learning can guarantee the quality of learning	2.64
X11	The online learning plan for one semester is clearly conveyed at the beginning of the lecture	3
X12	Online learning materials are presented in an interesting way	2.75

X13	Online learning materials are delivered clearly	2,89
X14	The interaction between lecturers and students in online learning takes place actively	2.81
X15	Delivery of online learning materials (lectures/practicum) facilitates students to learn actively (practice questions, case studies, discussions)	2.99
X16	The lecturer / Assistant has an adequate level of technology and media mastery	3.12
X17	Lecturers always accompany during online learning	3.03
X18	Feedback from lecturers in online learning can be used by students to better understand the lecture material	2.99
X19	Online learning provides an opportunity to reflect on material understanding through self-assessment	2,95
X20	The characteristics of the material delivered are in accordance with the online learning media used	3,04
X21	Easy-to-use online learning platform	2.93
X22	Online learning media (Whatsapp, Line, Google Meet, Zoom, etc.) can be used easily	3.29
X23	Online learning materials can be downloaded easily	3.24
X24	Administration provides administrative service support during online learning	3.08
X25	Lecturers provide support in overcoming difficulties in online learning	3
X26	Information about student learning progress and success can be accessed easily in online learning	3
X27	Study Program provides a means of submitting input/complaints about students related to online learning	2.97
X28	Internet quota is always available when participating in online learning	2.83
Average		**2.93**

positively associated with the complete score of the questions in each of the surveys (count r value > r table value), hence it was valid. Using the Cronbach Alpha (α) statistical test, reliability testing was performed to assess the consistency of the measuring device employed in the study. The learning process performance evaluation questionnaire test yielded a score of = 0.915, and the learning effectiveness assessment questionnaire yielded a value of = 0.845, indicating that both questionnaires are considered trustworthy. The questionnaire can thus be considered to be useful.

4.2 Cross Tabulation Analysis (Crosstab)

The questionnaire was filled out by 75 students consisting of the 2017-2019 class, with the proportions as shown in Figure 2. The results of the crosstab analysis between this data and online learning effectiveness data obtained a Pearson Chi-Square significance probability value of 0.809 > 0.05. This shows that there is no relationship between the class and the effectiveness of online learning.
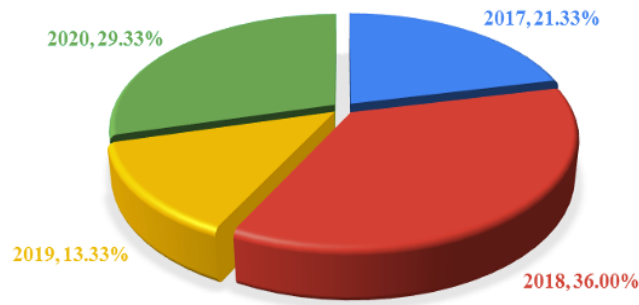
Figure 2. Class Pie Chart

The proportion of the GPA of students who fill out the questionnaire is shown in Figure 3. Crosstab analysis was performed between this data and the data on the effectiveness of online learning, the Pearson Chi-Square significance probability value was $0.451 > 0.05$. This shows that there is no relationship between GPA and the effectiveness of online learning.
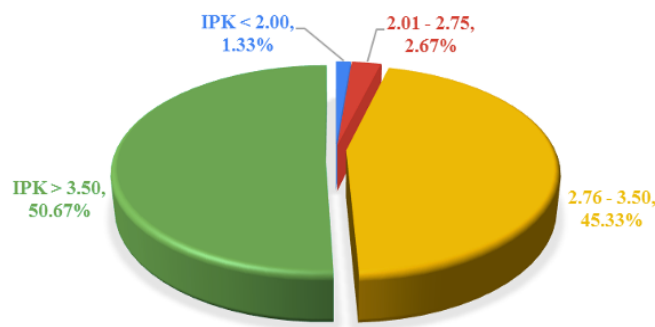

Figure 3. GPA (IPK) Pie Chart

Figure 4 depicts the percentage of students that choose online learning material. It is clear that video conferencing is the most popular medium among students in the online learning process, followed by audio conference and chat, which have nearly equal numbers. The Pearson Chi-Square significant probability value for this data and the data on the efficacy of online learning was $0.485 > 0.05$ after crosstab analysis. This demonstrates that there is no link between preferred online learning media and online learning efficacy.
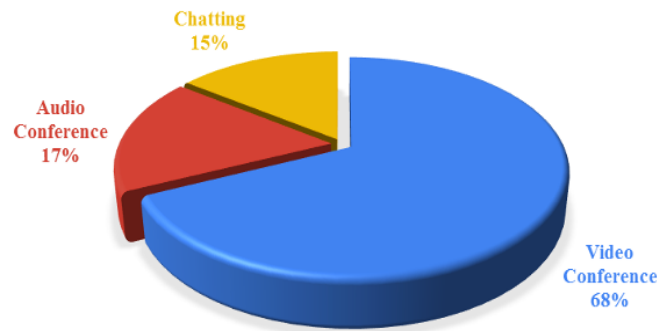
Figure 4. Preferred Media Pie Chart

4.3 Classic Assumption Test

Classical assumption tests are several statistical tests that need to be carried out before performing multiple regression analysis to ensure the validity of the use of multiple linear regression, which consists of:

o   The normality test was used to see if the residual variable in the regression model had a normal distribution. The significant value of Asym. Sig. (2-tailed) of $0.842 > 0.05$ was obtained from the test results, indicating that the data is normally distributed.

o   The multicollinearity test was used to see if there is a correlation between the independent variables in the regression model. The value of the variance inflation factor (VIF) of all independent variables is less than 10, hence there is no multicollinearity between independent variables in the regression model, according to the test findings.

o   A heteroscedasticity test was conducted to determine the occurrence of variance inequality from the residual of one observation to another observation. From the test results, there are 2 variables ($X25$ and $X5$) that have a Sig value. <0.05, which indicates that heteroscedasticity occurs in the regression model, so the two variables are not used in multiple regression analysis.

o   A linearity test was employed to determine whether there is a significant linear relationship between two variables. From the test results, there are 4 variables ($X4$, $X9$, $X11$, $X14$) that have Deviation from Linearity Sig values. <0.05, which indicates that there is no significant linear relationship between the independent variable and the dependent variable, so the four variables are not used in multiple regression analysis.

4.4 Multiple Linear Regression

Multiple regression analysis was conducted to determine the performance variables of the online learning process that affect the effectiveness of learning. There are 22 online learning

process performance variables that are used as independent variables, while the dependent variable uses the average of the online learning process effectiveness variables (Y1, Y2, Y3, and Y4). Based on the processing results, the Adjusted R Square number is 0.502. This shows that 50.2% of the variation in the dependent variable can be explained by variations in the independent variables, while the remaining 49.8% is explained by variables outside the research model. Multiple correlation values (R) of 0.723 indicate a strong relationship between the dependent variable and the independent variable.

The effect of the independent variables together on the dependent variable is carried out by conducting a simultaneous significant test (F test), with the following hypothesis formulation:

H_0: The regression coefficient is not significant

H_1: The regression coefficient is significant

The level of significance (α) used is 5%.

Decision-making criteria:

Reject H_0 and accept H_1 if the significance value is < 0.05

Accept H_0 and reject H_1 if the significance value is > 0.05

Based on the processing results, obtained the value of Sig. of 0.000 (<0.05), so the decision to test the simultaneous hypothesis is to reject H_0 and accept H_1. This shows that the regression coefficient is significant so it can be stated that the performance of the online learning process has a significant effect on the effectiveness of learning.

The effect of each independent variable on the dependent variable is carried out by performing a partial significant test (T-test) with the following hypothesis formulation:

H_0: the online learning process performance variable does not affect the effectiveness of online learning

H_1: the performance variable of the online learning process affects the effectiveness of online learning

Based on the results of processing, the values of Sig X19, X7, and X20 < 0.025, so the independent variable is declared to have a significant effect on the dependent variable, with the regression equation:

$$Y = 0.011 + 0,388 \, X19 + 0,249 \, X7 + 0,308 \, X20 \qquad\qquad (3)$$

Information :

Y   = effectiveness of online learning

0.011   = constant

X19 = online learning provides an opportunity to reflect on the understanding of the material through self-assessment.

X7   = online group work can be done easily

X20 = the characteristics of the material delivered according to the online learning media used

According to the results of multiple regression analysis, it means that only 3 variables directly affect the effectiveness and performance of online learning. These three variables can explain the effectiveness and performance of online learning by as much as 50.2% (shown by the adjusted R2 value). This indicates that 49.8% of the population is still excluded from these variables. This is an excellent chance for additional investigation. These three variables require special consideration when building online learning approaches since they have a direct influence.

4.5   SWOC Analysis

The SWOC study was performed to determine the strengths, weaknesses, opportunities, and difficulties associated with the present online learning process. The study was based on the value and efficacy of online learning, as well as the findings of multiple linear regression analysis. Classification of value quality is carried out based on the established criteria as shown in Table 4.

Table 4. Quality Criteria

Range	Quality
$1 \leq$ value < 1.75	Very bad
$1.75 \leq$ value < 2.5	Bad
$2.5 \leq$ value < 3.25	Good

| 3.25 ≤ value ≤ 4 | Very good |

4.5.1 Strength

Most of the performance aspects of online learning have been assessed as good by students. The average score is 2.93 (good). This can be seen as a strength for the study program in its implementation process. However, when viewed from the overall achievement of the variables, it is not close to the maximum value, so it is still necessary to make efforts to improve its performance.

Some of the variables that have been rated very well are the X5 online learning is carried out according to the predetermined schedule, X22 online learning media can be used easily and those that are close to very good are X23 online materials can be downloaded easily.

According to the results of interviews with students and lecturers, regarding the X5 variable, the implementation of online lectures is carried out on time according to schedule, even more precisely than the time for face-to-face lectures, because they are carried out in their respective homes so that everyone can immediately go online according to schedule. Students and lecturers are not constrained need time to go to campus, get stuck in traffic, and various other obstacles. Regarding the X22 variable, initially, students and lecturers were constrained by online media and had time to try various types of media at the beginning of the pandemic. However, after the second semester of online learning, students and lecturers are used to it and have found the easiest, most convenient, and efficient media, namely video conferencing media in the form of zoom and google meet. Regarding the X23 variable, at the beginning of the pandemic the learning management system had not been widely socialized and emphasized to be used. Learning materials are also still in a form suitable for face-to-face. However, in the second semester, lecturers and students are trained to use the learning management system. Lecturers are required to make learning materials for online learning and upload them to the provided learning management system. Thus, the learning materials are neatly organized and easy for students to download.

In addition, 8 variables are assessed with a score above 3, which means that they are already in the upper limit of good scores. These variables are X1 online learning materials are oriented towards student independence, X3 online learning materials are arranged systematically, X4 online learning materials are in accordance with the predetermined learning plan, X6 it is easy to collect assignments/reports online, X16 lecturer/ assistant has an adequate level of technology and media mastery, X17 lecturers always accompany during online learning, X20 the characteristics of the material delivered are in accordance with the online

learning media used, and X24 administration provides administrative service support during online learning.

These variables are considered very good by students because the learning materials have been specifically designed for online learning so that they are systematic, planned, and in accordance with the implementation of online learning. In addition, lecturers and assistants have also studied a lot of technology and media related to online learning, so that online learning can be carried out properly and smoothly. On the other hand, administrative officers also in the second semester have started to get used to handling the implementation of online learning, so that students feel it is helpful and easy to ask for help or administrative assistance related to online lectures.

4.5.2 Weaknesses

Based on student assessments, there is a variable that is considered bad, namely X7 online learning can be done easily. Even though this variable affects the effectiveness of online learning, it can be seen from the results of multiple linear regression analysis. One of the important things for Industrial Engineering graduates is to be able to work in groups, both as leaders and as people being led. Therefore, many of the assignments given are group work. With assignments that are group work, students learn to lead, be led, communicate, relate, make decisions together, resolve conflicts, and others.

However, when learning has to be done online due to the pandemic including work in groups or group discussions, most students feel uncomfortable. This is because students are not used to having to work in groups online. They complain about the limited media that can be used for free, and the high quota fees when all members are on camera. If all members of the on-camera group discussions are fine and continue to be done non-online, while off-camera students feel like they are not working in a group, even though they also have a longing to meet each other. Another thing that reduces the ease of group work is that there are often group members who don't participate in discussions, or sometimes there are members who work in groups or group discussions but are doing other things at home so they don't concentrate. Considering the things above, it is necessary to make improvements to increase the ease and effectiveness of group work.

4.5.3 Opportunity

Based on the results of the cross-tabulation analysis (crosstab) there is no relationship between class and GPA in the effectiveness of online learning, it shows that the online learning

process can be followed effectively by all students. Starting from the second semester, students and lecturers are familiar and trained with online learning, and students and lecturers can take part in learning better. Even when viewed from the final grades of courses achieved by students, the average is higher than the final grades achieved when learning is carried out face-to-face (non-online). This is in line with the results obtained by Ramli et al. (2020), Satyawan et al. (2021), and Suprianto et al. (2020). With this discovery, it means that it is an opportunity to carry out online or hybrid learning even when there is no pandemic. This increase in student achievement is because, during online learning, lecturers are required to make learning materials in the form of text and videos and systematically upload them to the learning management system. So that students can easily access and learn from the material that has been provided. After uploading, lecturers also carry out synchronous learning, namely virtual face-to-face via video conference platforms or through other media. On this occasion, students can ask questions or discuss and the lecturer will explain again material that has not been understood by students.

By proving that online learning is effective, other things are also opportunities for universities in Indonesia. The Indonesian Education Ministry has just launched a new program for Higher Education, "Merdeka Belajar Kampus Merdeka (Independent Learning, Independent Campus) or usually called MBKM". With this program, students are given the freedom to learn and gain experience from various sources, both formal and non-formal education. In this program, students can attend lectures in other study programs even other universities, do internships in companies, teach in remote areas, as well as do community service (Direktorat Jendral Pendidikan Tinggi, 2020). Effective online learning can be the right solution for the implementation of this MBKM, because:

1. With online or hybrid learning methods, students can take lessons in places far from where they live, even in other countries. Study programs or universities can cooperate with other colleges and students take their courses without having to live there.

2. With online or hybrid learning, it is possible to collaborate with other parties, for example, micro, small, and medium enterprises (MSMEs) to be involved in lectures and students to interact with them in lectures and the MSMEs' business.

In addition, online learning can also be used as a means for universities to reach people in remote areas. Opportunities to study at universities become greater and educational equity can be increased. Another opportunity that opens up with effective online learning is to go international. Universities in Indonesia are currently leading world-class universities. The

online learning method will facilitate the achievement of this goal because students can attend lectures from far away places efficiently and effectively. In conclusion, by knowing that online learning is effective, the barriers and obstacles to obtaining learning are increasingly being overcome.

4.5.4 Challenges

In contrast to the previously described opportunities related to online learning, some challenges need to be faced. The unpreparedness of all parties at the beginning of the pandemic and the sudden need to conduct online learning is a challenge. Students are not familiar with this learning method. According to the results of interviews, this causes discomfort for students, lack of motivation, stress, and fatigue because they need to adapt. For the lecturers, it is also a tough time, because it is necessary to immediately change the learning methods and learning materials to match the learning methods. Some exact subjects that require a lot of following complex calculation methods have the most difficulty. The study program also experienced difficulties, because they needed to think about how to deliver practicum material online, carry out online study program administration, there were no online learning media, the learning management system had not been socialized, and so on. However, these things can be handled quite well when entering the second semester of online learning.

However, additional issues occur, such as the fact that many students live in places that are not large cities or islands, resulting in a weak signal. Synchronous learning is occasionally disturbed as a result of this. Another issue is synchronous learning, which necessitates a significant amount of quota due to the requirement to download learning materials for each course. Quotas are vital, but so is having a competent device. This requirement is a concern for some pupils from low-income homes. Many parents of students in Indonesia saw a drop in their income during the epidemic, with some even losing their jobs. Quotas become a concern in this situation.

The next challenge is from the personal side of the students themselves. Online learning affects the eye health of students who still attend many lectures. Because apart from synchronous online learning, they also stare at gadget screens all day long to read learning materials, watch learning videos, and make various assignments. Next, problems also occur because of motivational problems. The informal learning atmosphere at home makes the learning atmosphere less conducive, causing students to be less than optimal in attending lectures. The last challenge from the student side is the stress experienced by students because

they cannot gather and interact with friends. Although the students got used to it over time, there were still things that they felt were missing.

For professors, online learning is difficult because they must quickly create relevant learning materials for online learning, and develop ways to attend lectures successfully while also missing out on interaction with students and colleagues.

The challenge for the study program is to adapt the form of practicum so that it may be done online, rather than in a laboratory with a diverse equipment, where students get experience by doing numerous experiments themselves.

Considering the strength of existing opportunities and strengths, and the effectiveness of online learning that has been implemented, online learning can be an alternative learning method. Associated with the weaknesses and challenges that exist, it is necessary to make efforts to overcome them. Several things can be done, including:

1. To carry out group assignments, lecturers need to provide a certain time slot by opening the media for group assignments, so that students get clarity of time, and all students participate in this activity. Lecturers can also supervise the implementation of group assignments so that students are more motivated to follow them and there is a clear schedule.

2. Develop a schedule for synchronous learning, time for students to study learning materials online, as well as student workloads. This is done to reduce the time students have to stare at gadgets which cause decreased eye health.

3. Planning synchronous learning, and assignments in ways that further improve relations between students, for example by holding games, providing time to chat together, and others.

4. Allocate funds to help students who are less well off financially. With online learning and campus operations also being a hybrid, the costs incurred by universities have decreased. Many costs can be saved, such as electricity, telephone, water, cleaning, and other operational costs. These cost savings should be diverted to help students in need, especially for quota fees.

5. Create work units that can help lecturers to prepare learning materials, such as making interesting learning videos, interesting presentation slides, and others.

6. The study program is exploring creating a virtual reality laboratory so that students can still get an experience like in a laboratory, but still safe and accessible from a distance because it is virtual reality.

5. Conclusion

Because of the COVID-19 pandemic, online learning has become a necessity. Distress

and confusion at the start of the pandemic because of the sudden requirement to conduct online learning can be resolved over time with various efforts. However, once students, lecturers, study programs, and administrative staff have gotten used to it and mastered it, online learning has become a new way for universities to improve their teaching methods.

The pandemic forcing of online learning is a blessing in disguise because it hastens the adoption of digital technology in education. Government MBKM programs, international learning, and outreach programs can all benefit from online learning methods that use digital technology.

Other researchers at universities and other countries have discovered that online learning in the study program under review is extremely effective. However, there is still room to improve the learning process' performance hence its usefulness. Study programs can take a variety of approaches to address shortcomings and address current issues, turning them into strengths and opportunities.

Because the variables analyzed can only explain 50.2 percent of the variance in learning efficiency, subsequent research can be directed by looking for other variables that affect learning effectiveness. Furthermore, after the online learning system is enhanced and applied, more studies can be done by measuring the effectiveness of learning once more. Other studies can be carried out to look into specific student issues like motivation, health, and stress levels.

Conflict of Interest

The authors declare no conflict of interest

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Biography

Christina Wirawan is a lecturer at Industrial Engineering, Maranatha Christian University. Her research interest includes product-design, service and quality.
Yulianti Talar is is a lecturer at Industrial Engineering, Maranatha Christian University. Her research interest includes marketing and quality improvement of learning.
Jimmy Gozaly is is a lecturer at Industrial Engineering, Maranatha Christian University. His research interest includes marketing and quality improvement of learning.
Axel Varian Kurniawan is a student at Industrial Engineering, Maranatha Christian University. The topic of his final project is service quality improvement in educational marketing.

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