

The Analysis of Online Learning Tools Based on Students Survey Due to Covid-19 Pandemic

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Abstract

The Covid-19 pandemic situation that occurred in 2021 has made changes to a fast pattern in various sectors, one of which is education. There are various methods used to secure teaching and learning activities by minimizing physical contact in order to reduce the increase in the viral transmission curve. Changing the method from offline to online at a rapid pace raises a new problem that reduces the effectiveness of learning activities for students. Some of these things are caused by the quality of the internet network that is not optimal, constraints in the habituation of using online learning methods and differences in understanding of the material through the use of the *video conference* application. This study will provide a comprehensive explanation of the level of effectiveness of online learning in the long and short term with non-parametric statistical analysis on categorical data analysis through the *Chi-Square* test with a research sample of 150 students spread across the University of Jakarta and Bandung.

Keywords: Covid-19, Effectivity, Online Learning, Video Conference Application.

Abstrak

Situasi pandemi Covid-19 yang terjadi di tahun 2021 ini membuat terjadinya perubahan dengan pola yang cenderung cepat di berbagai sektor, salah satunya adalah pendidikan. Terdapat berbagai metode yang digunakan untuk mengamankan aktivitas belajar mengajar dengan meminimalisir kontak fisik demi mengurangi kenaikan kurva penularan virus. Perubahan metode dari luring menjadi daring dengan tahap cepat menimbulkan sebuah permasalahan baru yang mengurangi tingkat efektivitas kegiatan belajar bagi mahasiswa. Beberapa hal ini disebabkan oleh kualitas jaringan internet yang tidak maksimal, kendala dalam pembiasaan penggunaan metode belajar daring serta perbedaan pemahaman materi melalui penggunaan aplikasi *video conference*. Penelitian ini akan memberikan penjelasan yang komprehensif mengenai tingkat efektivitas dari pembelajaran daring dalam jangka panjang maupun pendek dengan analisis statistik non parametrik pada analisis data kategorik melalui uji *Chi-Square* dengan sampel penelitian sebanyak 150 mahasiswa yang tersebar di Universitas wilayah Jakarta dan Bandung.

Kata Kunci: Covid-19, Efektivitas, Pembelajaran Daring, Aplikasi Video Conference.

Received on xxx, accepted on xxx, published on xxx

I. INTRODUCTION

Covid-19 virus has become a global problem since it's outbreak on December 2019 at Wuhan Province [9], and it is already decided as a global pandemic [10]. It causes numerous setbacks in many sectors, such as economy, social, politics, and the most importantly, education. Therefore, every government around the

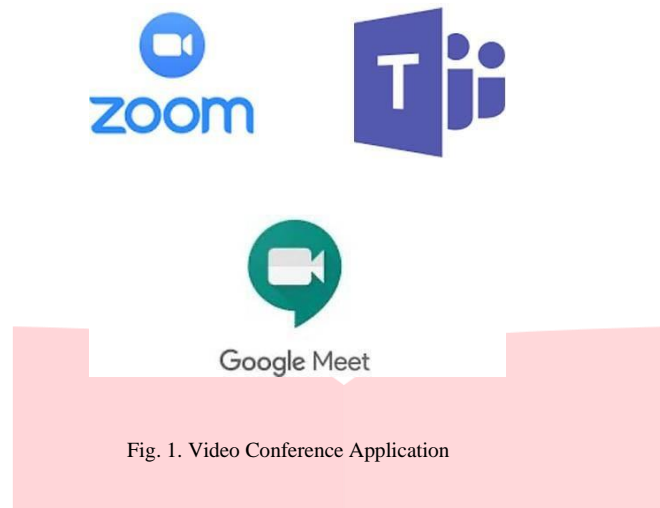


Fig. 1. Video Conference Application

world must come out with certain solutions regarding to the issue – whether it's long or short term—to make sure everything could run accordingly with slight shifts along the way considering there should be a massive social distancing to flatten the virus spread curve. There are multiple temporary solution came out to the public, such as the race of technology usage in many sectors. One of the example is to make people to work remotely, with the help of internet connection.

In the current education sector, there are also major changes. One of them is the full use of cloud- based video conferencing applications or sites or other online learning sites in the teaching and learning process to reduce physical contact between lecturers and students. The video conference application is an attempt to optimize the distance learning system [1]. Maximizing the benefits of using video conferencing applications will save costs and time. Online learning is considered to be the only medium for delivering material during the current pandemic emergency. Online learning is learning that uses an internet network with accessibility, connectivity, flexibility, and the ability to generate various types of learning interactions [8]. Online learning has not only just been implemented after the pandemic, but online learning has become a world demand since the last few years [3].

There are three concerns in this research. Firstly, to explain how the video conference application able to elevate the efficiency of learning. Secondly, to explain the issues of online learning. Thirdly, to explain the effectivity of online learning method which in this research, involves the university students across Jakarta and Bandung area. This is a fascinating research since there would be certain issues could be found, considering of the sudden alteration of learning method in most University in Jakarta and Bandung due to the global pandemic situation which able to lead into the decline of learning effectivity. This writing was made to give a comprehensive explanation towards the effectivity of online learning for university student across Jakarta and Bandung area through non-parametrical statistic analysis and categorical data using Chi-Square test. Researcher also gave the comprehensible explanation into the issue with theoretical, advantage, and also disadvantages approach, and lastly could lead to a certain suggestion in order to elevate the effectivity of online learning in short and long term range, especially in this pandemic situation.

II. LITERATURE REVIEW

A. Video conference application

Video Conference is a technology which provides a simplicity of real-time meeting with a minimum inconvenience level. The need of video conference application is a rather vary. The main components of video conference application are camera, codec, remote control, and micpod [2]. The stability of

internet connection is needed in order to optimize the usage of a video conference application. There is a massive usage of video conference in every sector of human activity nowadays, especially during this pandemic situation which leads into the variations of video conference platform among the internet, three of them are Zoom, Google Meet, and Microsoft Teams. Here are the brief information for features and specifications of them [4] :

1) Zoom

Zoom is a video conference application which able for personal and business usage. This platform is a free user-friendly application and provides mobile and PC version and has the ability to store up to 100 participants in free account and 500 participants in subscribed business account. Zoom has screen sharing, HD virtual background, and customizable meeting ID which accessible in free account. Albeit the broad accessible feature, Zoom has a 40 minutes meeting limit in free account. This platform is properly integrated in every software.

2) Google Meet

Google Meet is a free high-scale video conference application which owned by Google. Although, this platform only provides 50 minutes of duration limit for 500 participants. In addition, the screen sharing, HD virtual background, and customizable meeting ID features are not accessible for free account and only integrated with another Google products.

3) Microsoft Teams

Microsoft Teams is a free video conference application which owned by Microsoft. This platform also accessible for free, although with minimum feature (audio and video conferences). The screen sharing and HD virtual background are accessible on Microsoft 365 business, and only integrated with other products of Microsoft.

B. Online learning

Online is the abbreviation of “on the line”, this term refers to every activity which connected to the Internet [7]. In this case, online learning is the newest method which greatly involves the usage of internet connection. Ideally, online learning method is oriented on how to create an interactive learning environment [5]. Sistematically, students will eventually learn to be more creative, active, and independent in this new learning method. There are multiple issues found in order to achieve an effective usage of this online learning, some of them are infrastructural issue, and the stability of internet connection, which occurs in suburbs or rural area. The key of this method is to minimize the on class meeting, and to alter the face-to-face meeting into online real time meeting, with an interactive approach on the process [11].

C. Chi-Square

Chi-square test can be used to test the hypothesis if the population consists of two or more classes where the data is categorical [6]. Chi-square test or chi square test is the most widely used non-parametric test. In this study, if it is seen from the existing population that the proportions of each category are seen, the purpose of the hypothesis testing carried out here is to predict if the number of samples is developed to be larger, it is necessary to do a test.

III. RESEARCH METHOD

This research use the quantitative data collecting approach. There are 150 university students as respondents which spreads across universities in Jakarta and Bandung area. In this study, the data collection media used was a questionnaire. Provided that the respondent is only given the opportunity to fill out the questionnaire once. And obtained the data online as many as 104 respondents and offline as many as 46 respondents. The questionnaire instruments needs to pass through the validity and reliability test. This research also use numerous variables : video conference (X1), behavioral approach (X2), network quality (X3), and online learning (Y). The tool for this analysis is Chi-square test. Chi-square test is formulated in this equation below :

$$\chi^2 = \sum_{i=1}^k \frac{(O_i - E_i)^2}{E_i} \quad (1)$$

χ^2 variable as the distribution of Chi-square, O_i variable as the observation value in i , and E_i variable as the expectancy value in i . There are multiple steps in Chi-Square test:

- 1) Formulating the hypothesis H_0 and H_A
 - H_0 : There are no different distributions from every answer category in research's questions with the expectancy factor.
 - H_A : There are different distributions from every answer category in research's questions with the expectancy factor.
- 2) Deciding the α significance level
(In general, research in the field of education uses a significance level of 0.05)
- 3) Counting the Chi-square distribution
- 4) Finding the frequency of expectancy value (E_i) = $\frac{\text{Data Amount}}{\text{Categories Amount}}$
- 5) Deciding the value of χ^2 table
 - a. Significance level (α) = 0,05
 - b. Degree of freedom (d.f) = k - 1
- 6) Deciding the research criteria

If χ^2 count \leq χ^2 table, then H_0	Accepted
If χ^2 count $>$ χ^2 table, then H_0	Rejected
If p value \geq 0,05 then H_0	Accepted
If p value $<$ 0,05 then H_0	Rejected
- 7) Comparing χ^2 count with χ^2 table or p value with α
(Decision on H_0 will be rejected or accepted)
- 8) Making conclusions

IV. RESULTS AND DISCUSSION

In this study, the category frequency distribution test of each result of the research question (variable) was carried out based on observations with the expected variable category frequency distribution. The following is in Fig.2 a summary of the respondents :

A. Chi-Square test between Video Conference Application with Online learning

- Hypothesis :
 - H_0 : There is a difference in the average of video conference usage in order to increase the quality of online learning ($E_{MS. TEAM} = E_{GOOGLE MEET} = E_{ZOOM}$)
 - H_A : There is a difference in the average of video conference usage in order to increase the quality of online learning

- The results of the Chi-square distribution are obtained as follows :

The descriptive statistic table shows there is a sample amount of (N) which consists 150 students, with the minimum answer category is Ms. Teams (1), and Zoom is the maximum answer category (3).

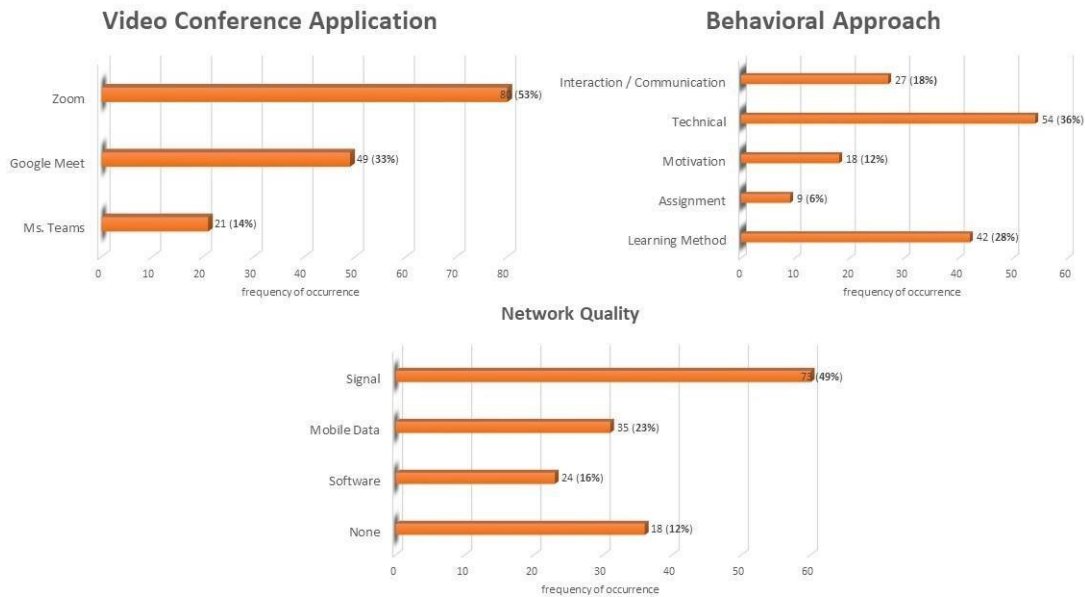


Fig. 2. Summary Respondents

TABLE I
DESCRIPTIVE STATISTIKS

	N	Minimum	Maximum
Video Conference Application	150	1	3

- The results of the expected frequency values are obtained as follows :

TABLE II
FREQUENCIES

	Observed N	Expected N	Residual
Ms. Teams	21	50.0	-29.0
Google Meet	49	50.0	-1.0
Zoom	80	50.0	30.0
Total	150		

The frequency table above shows student preferences in choosing applications to conduct online learning activities. There were 21 students (14%) who chose to use Ms. Teams, 49 students (33%) who chose to use Google Meet, and 80 students (53%) who chose to use Zoom. This shows that the majority of students prefer to use Zoom to support online learning activities. In this study, the probability of the expected appearance of each answer category is the same from the number of samples. The expected value of each answer category is $E = 150 / 3 = 50$. Residual is the difference between the observed value against the expectation of each answer category.

- The Chi-square statistical test with the Chi-square table obtained the following results :
In the statistical test results obtained Chi-square value of 34.840 with degrees of freedom of 2. Based on the table above, the calculated Chi-square value is greater than the Chi-square table ($34,840 > 5,991$)

TABLE III
TEST STATISTICS

	Value	df	Asymp. Sig.
Chi-square	34.840 ^a	2	.000

and the p -value is smaller than α ($0,000 < 0.05$). Thus H_0 is rejected and H_A is accepted. This means, with a 95% level of confidence, **there is a difference in the average users of the video conferencing application used to support online learning activities.**

B. Chi-Square test between behavioral approach to online learning

- Hypothesis :

H_0 : There are no differences in behavioral approach to online learning ($E_{INTERACTION / COMMUNICATION} = E_{TECHNICAL} = E_{MOTIVATION} = E_{ASSIGNMENT} = E_{LEARNING METHOD}$)

H_A : There are differences in behavioral approach to online learning

- The results of the Chi-square distribution are obtained as follows :

TABLE IV
DESCRIPTIVE STATISTICS

	N	Minimum	Maximum
Behavioral Approach	150	1	5

Descriptive Statistic table shows there is a sample amount of (N) which consists 150 students, with the minimum answer category is Assignment (1), and Technical is the maximum answer category (5).

- The results of the expected frequency values are obtained as follows :

TABLE V
FREQUENCIES

	Observed N	Expected N	Residual
Assignment	9	30.0	-21.0
Motivation	18	30.0	-12.0
Interaction / Communication	27	30.0	-3.0
Learning Method	42	30.0	12.0
Technical	54	30.0	24.0
Total	150		

The frequency table above shows a behavioral approach that has changed in online learning methods. This difference is found in: 9 students (6%) who answered differences in assignments, 18 students (12%) who answered differences in motivation, 27 students (18%) who answered differences in interaction / communication, 42 students (28%) who answered differences in learning methods, and 54 students (36%) answered differences in technical matters. This shows that the majority of students answered that there were differences in technical and learning methods in online lectures. In this study, the probability of the expected appearance of each answer category is the same from the number of samples. The expected value of each answer category is $E = 150 / 5 = 30$. Residual is the difference between the observed value and the expectation of each answer category.

- The Chi-square statistical test with the Chi-square table obtained the following result :

In the statistical test results obtained Chi-square value of 43.800 with degrees of freedom of 4. Based on the table above, the calculated Chi-square value is greater than the Chi-square table ($43,800 > 9,488$) and

TABLE VI
TEST STATISTICS

	Value	df	Asymp. Sig.
Chi-square	43.800 ^a	4	.000

the p -value is smaller than α ($0,000 < 0.05$). Thus H_0 is rejected and H_A is accepted. This means, with a 95% confidence level, **there are different behavioral approaches to implementing online learning.**

C. Chi-square test between Network Quality and Online Learning

- Hypothesis :
 H_0 : There are no network quality issues on online learning activities ($E_{\text{SIGNAL}} = E_{\text{MOBILE DATA}} = E_{\text{SOFTWARE}} = E_{\text{NONE}}$)
 H_A : There are network quality issues on online learning activities
- The results of the Chi-square distribution are obtained as follows :

TABLE VII
DESCRIPTIVE STATISTICS

	N	Minimum	Maximum
Network Quality	150	1	4

The descriptive statistic table shows there is a sample amount of (N) which consists 150 students, with the minimum answer category is none (1), and signal is the maximum answer category (4).

- The results of the expected frequency values are obtained as follows :

TABLE VIII
FREQUENCIES

	Observed N	Expected N	Residual
None	18	37.5	-19.5
Software	24	37.5	-13.5
Mobile Data	35	37.5	-2.5
Signal	73	37.5	35.5
Total	150		

The frequency table above shows that during online learning activities, students experience several problems with network quality. The poor quality of the network is caused by several things, including 24 students (16%) who experienced problems with software, 35 students (23%) experienced problems with mobile data, and 73 students (49%) experienced problems with signal. Even so, there were 18 students (12%) who stated that they did not experience problems with network quality. This shows that the majority of network quality problems that often affect the effectiveness of online learning are signal quality disturbances. In this study, the probability of the expected appearance of each answer category is the same from the number of samples. The expected value of each answer category is $E = 150 / 4 = 37,5$. The residual is the difference between the observed value against the expectations of each answer category.

- The Chi-square statistical test with the Chi-square table obtained the following result :

In the statistical test results obtained Chi-square value of 48.773 with degrees of freedom of 3. Based on the table above, the calculated Chi-square value is greater than the Chi-square table ($48.773 > 7.815$) and the p -value is smaller than α ($0,000 < 0.05$). Thus H_0 is rejected and H_A is accepted. This means, with a 95% level of confidence, **there are network quality issues on online learning activities.**

TABLE IX
TEST STATISTICS

	Value	df	Asymp. Sig.
Chi-square	48.773 ^a	3	.000

V. CONCLUSION

The Covid-19 pandemic situation that occurred in 2021 has made changes to a pattern that tends to be fast in various sectors, one of which is education. Changing the method from offline to online at a rapid pace raises a new problem that reduces the effectiveness of learning activities for students. Based on the research conducted, from the distribution of existing data, with a confidence level of 95%, there is a difference in the average video conference application users where students tend to choose the Zoom application over Google Meet and Ms. Teams. This happens because Zoom is user-friendly and has a free screen sharing feature so it tends to be more flexible than Google Meet and Ms. Teams. And also seen from the results of the questionnaire obtained, this proves that the Zoom application is able to increase the effectiveness of online learning. In the behavioral approach, it can be seen with a confidence level of 95%, there are differences in behavioral approaches in implementing online learning technically and also in learning methods where the online learning process minimizes contact between lecturers and students. Also with a confidence level of 95% there are network quality issues during online learning activities. This results in reduced learning effectiveness due to technical glitches such as poor signal quality. So that student achievement in understanding a learning material decreases. Thus, the researcher can conclude that online learning tends to be less effective when used as a long-term learning method if the internet connection disruption cannot be solved properly. Although, online learning methods are the only learning media that can be accessed during the current pandemic emergency.

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