

# Internet Data Consumption During Synchronous Teaching-from-Home Period at Sampoerna University

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**Abstrak**—Sejak awal merebaknya Covid-19 di Jakarta, pengajaran sinkronus dengan teknologi komunikasi Internet dan pengajaran asinkronus yang didukung Sistem Manajemen Pembelajaran (LMS) telah diadopsi di Universitas Sampoerna (SU). Pengajaran sinkronus yang semula menggunakan teknologi konferensi berbasis web kemudian dimutakhirkan menggunakan platform komunikasi yang telah dilanggan Universitas. Pemerintah membekali dosen dengan paket data sebesar 15GB (15.360MB) per bulan untuk mendukung kegiatan mengajar tersebut. Penelitian ini bertujuan untuk menganalisis apakah kuota data Internet yang disediakan oleh Pemerintah tersebut sudah mencukupi untuk mendukung proses pengajaran selama masa penelitian ini berlangsung. Penelitian ini menggunakan metode kuantitatif, pencatatan data primer selama tiga bulan, dan data deskriptif dengan non-probability sampling. Ditemukan hanya 9.281,34 MB kuota data yang digunakan (60,43%) dan masih tersisa 6.078,66 MB (39,57%). Kesimpulan yang dapat diambil dari penelitian ini adalah kuota data yang disediakan oleh Pemerintah cukup untuk satu bulan pengajaran sinkronus untuk tiga mata kuliah dengan masing-masing mata kuliah tiga SKS.

**Kata Kunci:** Pengajaran; Sinkronus; Kuota Internet; Konsumsi Data; Platform Komunikasi

**Abstract**—Since the beginning of Covid-19 in Jakarta, synchronous teaching with Internet communication technology and asynchronous teaching supported by the Learning Management System (LMS) have been adopted at Sampoerna University (SU). Synchronous teaching that initially used a web-based conference technology was later changed to using a communication platform that the University has subscribed to. Lecturers were provided with 15GB (15,360MB) of data per month to support these teaching activities. This research aimed to analyze whether the Internet data quota provided by the Government was sufficient to support the teaching process during this research period. This research used a quantitative method, recorded primary data for three months, and descriptive data with non-probability sampling. It was discovered that only 9,281.34MB of data was being used (60.43%) and still had 6,078.66MB (39.57%) remaining. The conclusion that can be drawn was that the Internet quota provided by the Government was adequate to cover one month of synchronous teaching for three courses with three credits each.

**Keywords:** Synchronous; Teaching; Internet Quota; Data Consumptions; Learning Management System; Communication Platform

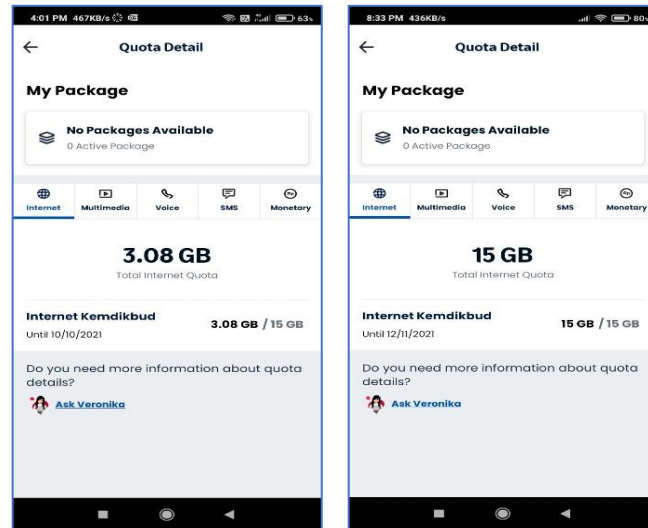
## 1. INTRODUCTION

At the beginning of Covid-19 in Jakarta, synchronous teaching initially used a web-based conference technology supported by the Learning Management System (LMS) adopted at Sampoerna University (SU) for asynchronous teaching-from-home activities. Lecturers were pushed into transforming lessons in a short amount of time [1]. The availability of supporting technologies, stable Internet access, and simple, appealing, and encouraging online learning in various learning media combinations are all significant considerations in conducting online learning [2].

LMS has become a critical tool [3] to support synchronous teaching activities. This synchronous teaching technology was later changed to a communication platform that the University has subscribed to, i.e., Microsoft Teams. Synchronous teaching-from-home processes were still online for SU's 4<sup>th</sup> quarter of the last year of 2021.

Teachers and students do synchronous learning directly over the Internet utilizing technologies. Asynchronous learning activities are not conducted directly. Contents are provided by the teacher/lecturer via the application, students read and comprehend the material independently [4].

Online learning also struggles with Internet quotas and a poor Internet connection [5] [6]. Registered Lecturers are provided with 15GB (15,360MB) of Internet quota to support these teaching-from-home activities. From September through December 2021, the Government provided Internet quota assistance three times for four months [7], shown in Figure 1 below:



**Figure 1.** Internet Quota in September and October 2021

Similar researches have been conducted: Internet data usage was measured from the Students' point of view with a specific Zoom application and GlassWire network monitoring tool [8] [9]; Internet data usage researches have been conducted previously in console-based online Battle Royale games [10], and also for synchronous teaching-from-home using BigBlueButton platform [11]; all of these were conducted during the Covid-19 pandemic situation.

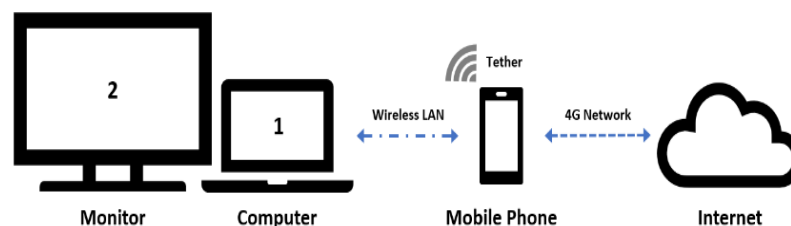
This research aimed to analyze whether the Internet data quota received by the Government was sufficient to support the teaching activities—especially synchronous teaching-from-home during this research period. Some communication platforms can support teaching during the Covid-19 period [12] [13] [14]. Teaching-from-home activities were conducted with the Microsoft Teams platform that SU has subscribed to. Microsoft Teams is a hub communication platform that combines features: discussions, material, and apps to create engaging and individualized learning environments [15], and this platform has been used in some educational institutions in Indonesia [16] [17].

## 2. RESEARCH METHODOLOGY

This research used a quantitative method, recorded primary data for three months, and descriptive data with non-probability sampling. The research was conducted by gathering data constantly from the exact location at home to uniformize the source.

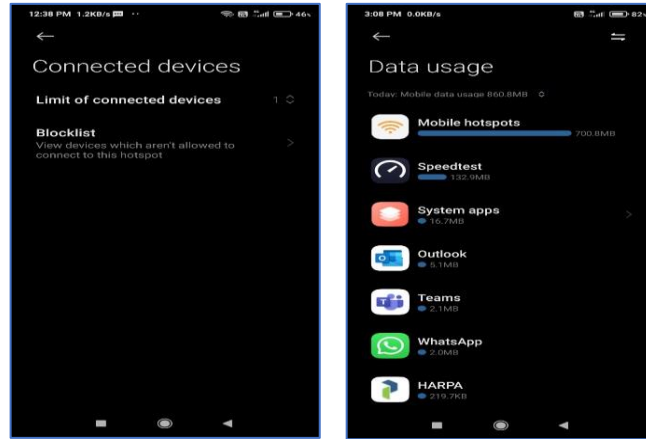
### 2.1 Research Preparations and Configurations

To measure the Internet quota consumption, the configuration being used was similar to the day-to-day teaching-from-home activities that uses the landline connection with Wireless LAN connected via Modem and Router. In this research, a mobile phone was connected to the Internet via a 4G Network. At the same time, this mobile phone was connected to a laptop computer via Wireless LAN through the Hotspot feature, as shown in Figure 2 below:



**Figure 2.** Wireless Network Setup

This setup shown in Figure 1 was similar to former research [10] but had different purposes. This mobile phone limited the connection to 1 device only to ensure that no other devices had a shared Internet connection. To monitor the Internet data usage, a feature mobile phone is used to see the amount of data consumed during synchronous teaching events, shown in the following Figure 3:



**Figure 3.** Mobile Phone Setup

## 2.2 Classes

There were three courses observed for this research. These courses have three credit points (150 minutes) each with only 1 section, divided into two classes per week (75 minutes each). In total, there were nine credit points during the research period. Generally, during the teaching-from-home activities, synchronous classes were begun in Microsoft Teams by the Lecturer 5 minutes before in the Meet now mode. Below were activities that happened during online teaching-from-home with its frequency in interaction with students.

**Table 1.** Synchronous Teaching-from-Home Activities

Activity	Frequency
Browse	Always
Sharing Screen	Always
Audio	Always
Video	Rare

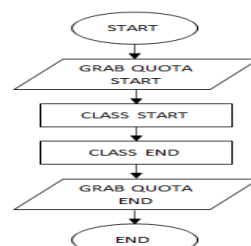
As shown in table 1, browsing the Internet during class was in Always mode. Lecturers needed to take attendance provided on the LMS. Lecturers also needed to publish class activities (Quizzes, Discussion, Assignments) on the LMS using Internet browser apps. Sharing screen activities during the class were in Always mode. Some classes required Students to be hands-on with other academic-related applications using two display monitors for easier interaction. Audio through microphone and speaker were used in all class activities. Video activities with the camera were rare; the camera was usually used for introduction at the beginning of the class in the first week, also during the mid-term exam and the final-term exam periods.

Class activities during the research period were the same as in other classes. They began with course updated information, gave a lecture, Questions and Answer session, took Students' attendance, and published class activities (Quizzes, Discussion, Assignments).

## 2.3 Data Acquisitions

Based on descriptions that have been previously mentioned, nine credit points were divided into three courses that had six classes per week, and each course had two sessions per week. The research period was three months, starting from mid-September to mid-November 2021.

The counting of Internet data consumption began when the Microsoft Teams - Meet now mode started at the beginning of the class, and the counting stopped at the end of the class session. This information was stored in a Spreadsheet, including time begin, time end, data begin, data end, time duration, and data consumption. These processes were done manually and are shown in the following figure 4:



**Figure 4.** Data Acquisition Process

Fifty-four classes occurred during this research period for the three courses, and only 36 were recorded. This is because the other 18 classes had teaching activities and online from Campus or connectivity issues at home that enforced the usage of home landline infrastructure for Internet connection. Some of the recorded data on a spreadsheet is shown in table 2:

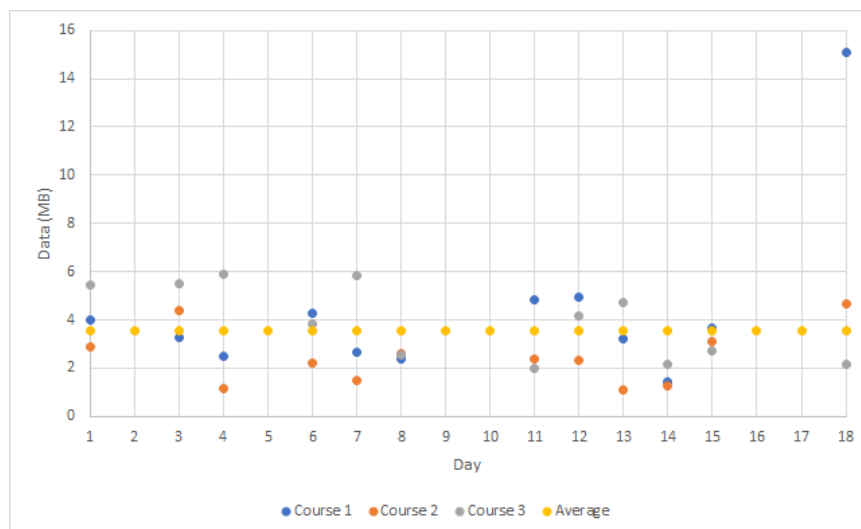
**Table 2.** Recorded Data

#	Date	Course	Time Begin	Time End	Data Begin	Data End
1	14/9/2021	Course 1	10:45	12:17	0	366.4
2	14/9/2021	Course 2	13:00	14:15	366.9	585.2
3	14/9/2021	Course 3	15:55	17:15	585.5	1020
4	21/9/2021	Course 1	10:46	12:17	0	295.9
5	21/9/2021	Course 2	12:55	14:16	296.6	652.1
6	21/9/2021	Course 3	15:58	17:25	652.1	1130
7	23/9/2021	Course 1	10:45	12:19	9.5	243.6
8	23/9/2021	Course 2	12:54	14:15	243.6	337.3
9	23/9/2021	Course 3	15:55	17:16	339	814.4
10	30/9/2021	Course 1	10:48	12:39	0	474.1
11	30/9/2021	Course 2	12:55	14:13	546.4	718.9
12	30/9/2021	Course 3	15:55	17:10	720.2	1006.6
13	5/10/2021	Course 1	10:45	12:00	0.9	199.3
14	5/10/2021	Course 2	12:55	14:16	228.5	348.5
15	5/10/2021	Course 3	15:55	17:11	377.3	820.8
16	7/10/2021	Course 1	10:45	12:15	0.8	215.2
17	7/10/2021	Course 2	12:55	15:42	229.4	664.7
18	7/10/2021	Course 3	15:54	17:09	666.6	857

As previously mentioned, only 6 data (date, course name, time begin, time end, data begin, data end) were required to be recorded for this research purpose. There were additional fields and columns that will be later used for calculations.

### 3. RESULT AND DISCUSSION

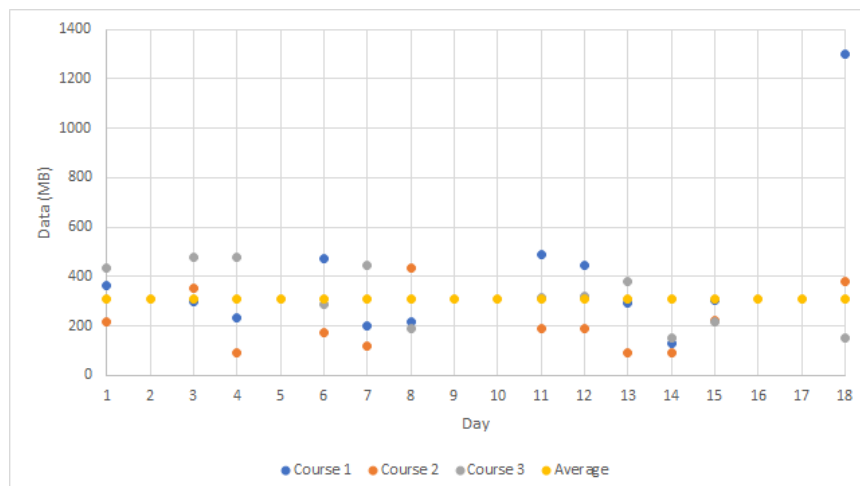
From the 36 sets of data recorded, these data are then analyzed, compared between courses, and visualized to better understand the Internet data consumption. Internet Data consumption in MB per minute is shown in Figure 5:



**Figure 5.** Data Consumptions per Minute (MB)

As shown in figure 5, most of the classes have below 4 MB per minute and below-average Internet Data Consumption. There were 15 classes above the average value, with one anomaly result on the last day of Course 1 where the data consumption reached 15.09 MB per minute. The average values were shown as yellow dots to simplify the analysis.

After Data consumptions per minute in MB were analyzed, then Internet Data consumptions in total (also in MB) were analyzed, shown in Figure 6 for classes from 3 courses:



**Figure 6.** Data Consumptions (MB)

Results that can be analyzed from Figure 6, only 15 classes were above the average of Internet Data Consumptions, and the rests were below the average. The minimum was 88.9 MB, and the maximum was 1,298.2 MB. This Internet Data Consumptions show that it is possible for lecturers to use prepaid Internet for each class. The average values were also shown as the yellow dot in the figure. Information in detail for each course is shown in the following table 3:

**Table 3.** Internet Data Consumptions Summary

		Course 1	Course 2	Course 3
Time (minute)	Average	91.17	85.33	84
	Standard Deviation	8.45	24.91	22.80
Internet Consumption (MB)	Total	4,743.11	2,552.60	3,841.70
	Average	395.26	212.72	320.14
	Standard Deviation	293	113.41	118.07

It is shown that Course 1 had the largest average of 91.17 minutes class duration, compared with the other two courses. These three courses theoretically had 75 minutes for three credit points split into two sections per week. All three courses' durations were above average because the Lecturer needed to begin the class around 5 minutes earlier and extend the class durations to take students attendance and publish class activities (Quizzes, Discussions, Assignments, Project). Time extension for the classes is shown on the standard deviation average.

The same table also shows that Course 1 has the most significant average Internet data consumption of 395.26 MB during the research period compared with the other two courses. Analysis can also be made that more extended average class is not always linear with the Internet data consumption. This was because each class in each course had different activities, different contents, or different videos to be shown. Seen also from the table, the gap between average value and the population standard deviation was huge.

## 4. CONCLUSIONS

Theoretically, classes were supposed to be conducted in 75 minutes per session because three credit points were split into two sessions per week. The Lecturer needed to begin the class around 5 minutes earlier and extend the class duration, making classes lasted longer than 75 minutes. It was discovered that only 9,281.34MB of data was being used (60.43%) per month from the provided 15GB (15,360MB) and still had 6,078.66MB (39.57%) remaining. The conclusion that can be drawn was that the Internet quota received by the Government was adequate to cover one month of synchronous teaching for three courses with three credit points each using the Microsoft Teams platform. Internet consumption of other communication platforms can be measured to support synchronous teaching-from-home [17]. Asynchronous teaching through LMS is also interesting to be measured in future research since various platforms have been implemented in higher education.

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