**Analysis of Student Academic Achievement and The Factors Affected as The Impact of Covid-19 Pandemic**

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**Abstract.** The Covid-19 pandemic outbreak has had a tremendous impact on all aspects of life, including education. In the second year of this pandemic, 2021, college students still feel the impact of it. The students conduct online learning and are still trying to adapt to this new normal era. In college, some students can maintain academic achievement, and some other are not. This study analyzes the impact of the Covid-19 pandemic on IST AKPRIND Yogyakarta student’s academic achievement by comparing the average score. Data obtained from primary and secondary data. The analysis of average score comparison shows that the Covid-19 pandemic has different impacts on student academic achievement in each course. Some student’s average scores during a pandemic are lower than before the Covid-19 pandemic, or vice versa. Based on the sample, the average lower score during the Covid-19 pandemic occurred in most students who had limited internet access and low learning motivation. Students who have better grades are those who carry out suitable study methods and attend lectures well. Based on the ANOVA test, a significant factor affecting student achievement during the Covid-19 pandemic was how to learn by re-listening to video records of lecturer material.

# INTRODUCTION

The Covid-19 pandemic is still a concern to this day. There is still a lot of research on the causes of the emergence of the Covid-19 pandemic, prevention, treatment, factors, impact, and how to deal with the impact. Measures to prevent transmission also continue, including always keeping a distance (physical distancing), using masks, washing hands, eating nutritiously, staying at home, and others. The spread of Covid-19 virus had become a daunting disaster [1]. The Covid-19 pandemic outbreak has had a tremendous impact on society regarding health, social, economy, education, tourism, and all aspects of life. In the second year of this pandemic, which is 2021, various parties in various fields are still feeling the impact. However, government programs to overcome the problems that arise have also been carried out. At the same time, people are also starting to adapt to new habits. About tourism, research by Cahyadi and Newsome [2] analyzed the impact of the Covid-19 pandemic on domestic and international tourism activity in geopark in Indonesia. The Covid-19 pandemic had a significant economic impact on tourism actors when business premises were forced to close. Another impact is that staff in the tourism industry can lost employment. Rahiem [3] found a high incidence of child marriage cases in West Nusa Tenggara Province, Indonesia. Wahyono [4] stated that this pandemic provides severe consequences for economic behavior and increases unemployment rates in Indonesia. Therefore, business actors need to create new business creations that can continue economic activities.

In education, the Covid-19 pandemic has changed the learning process from the classroom to the virtual environment [5]. There has been a technological disruption in education where 100% face-to-face learning has suddenly changed drastically to online at all levels of education. There will be positive and negative impacts. The positive impact inhibits the transmission of the Covid-19 pandemic, and digital technology plays a vital role. However, the online learning system still encounters many constraints in various places in Indonesia, such as educators who need to work harder to prepare methods and materials, the economic capacity of the community to facilitate internet quota costs, students find difficulty to absorb the material, rely on internet access, and much more. Online learning application also makes educators think again about the learning models and methods used [6].

The pandemic of Covid-19 quickly led to the closure of universities and colleges around the world [7]. As a result of the global Covid-19 pandemic, universities have transformed teaching digitally, accelerated inclusion, and used technology in methodological adaptation [8]. An empirical analysis of pandemic covid-19 impact on Indian higher education system revealed that viral outbreak has significant effects on Higher Education Institutions [9]. At the college level, positive things need to be done to reduce negative impacts, including (1) changing face-to-face learning to online learning; (2) increasing the use of technology in learning process; and (3) increasing student learning independence which can be considered in designing learning in the new normal era [10]. In their research, Burgess and Sievertsen [11] stated that the careers of university graduates in 2020 might be severely affected by the Covid-19 pandemic. They are predicted to have experienced significant teaching interruptions in the final part of their studies. Some competencies have not been fully met. Due to the pandemic, they are also likely to have difficulty getting a job because they efficiently recruit workers. Research by Amir et al. [12] evaluates the student perspective of distance learning compared to classroom learning, which distance learning use in the academic year 2019/2020 in Universitas Indonesia. The results are only 44.2% of students preferred distance learning over classroom learning. However, they agreed that distance learning is more efficient because there is more time to study and review study materials. The results of empirical studies of the use of e-learning system during a pandemic Covid-19 showed a positive mindset [7]. Research by Tafdhila et al. [13] conducts about student’s motivation at the STIK Siti Khadijah Palembang, Indonesia. It found an influence of online learning on student learning motivation during the Covid-19 pandemic. The average score of learning motivation after starting online learning is smaller than before online learning. Purnawinadi [14] analyzes nursing student academic achievement by the GPA comparative test before and during the pandemic. There is an increase of student achievement before and after a pandemic.

Institut Sains & Teknologi AKPRIND (IST AKPRIND) Yogyakarta, as one of the private universities in the Special Region of Yogyakarta, can produce graduates who excel in science and technology and have competencies according to the needs of the industries. The Covid-19 pandemic also has an impact on the lecture process and student achievement. Research on these impacts is needed to obtain strategic steps to maintain and improve the quality of learning. Therefore, this study took a case study or a sample of students at IST AKPRIND Yogyakarta. Research about the impact of the Covid-19 pandemic will continue to be very important to do. This study will analyze the impact of the Covid-19 pandemic on student achievement. The results of the study provide information on the comparison of student academic achievement before and during the Covid-19 pandemic, the factors that affect student achievement, and the choice of learning methods that students are interested in.

# METHOD

Data sources in this study are secondary and primary data. Secondary data is taken from academic data of IST AKPRIND Yogyakarta. Meanwhile, primary data was obtained from online surveys to students. The data sample taken is students in one of the Faculty of Applied Science study programs that actively study in odd Semester 2017/2018 to odd semester 2020/2021. Primary data was carried out through an online questionnaire given to students of specific courses. The total sample is 21 students. The research variables are:

1. The final score of worth student courses is 0 to 100. The courses divided into 1) courses with basic material in study programs, 2) courses using case studies, 3) courses with practicum, and 4) general courses. Then, these values ​​compared between before and during the Covid-19 pandemic. The before Covid-19 pandemic periods are odd semester 2017/2018, odd semester 2018/2019, and odd semester 2019/2020. Meanwhile, the current period of the Covid-19 pandemic is the odd Semester 2020/2021. The lecture method before the Covid-19 pandemic was classroom learning, and during the Covid-19 pandemic was online learning. Various application used to organize online learning namely Learning Management System (LMS), zoom, google meet, and WhatsApp group.
2. Constraints during online lectures are measured by internet access, lecturer teaching methods, materials, self-motivation, costs, and learning media.
3. How to learn while studying online, including 1) Opening LMS and downloading materials, 2) Studying material before class hours, 3) Studying material after class hours, 4) Discussing with classmates if there is something do not understand, 5) Listening to a video record of the lecturer material.
4. Opinion on implementing online lectures, including 1) All activities (structured, according to schedule, coordinated, 2) Attendance, and 3) Assignments, exams, and assessments.

The analytical method used are descriptive statistics, the independent samples t-test, and the Analysis of Variance (ANOVA). The independent samples t-test is used to compare the mean of two independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different. It uses to compare the average scores of students before and during the Covid-19 pandemic. The alternative hypothesis test is µ1 ≠ µ2 (the average before Covid-19 is different from the average during the Covid-19 pandemic). The conclusion is to reject Ho if the absolute value of the t-test statistic is greater than the t-table or the P-value is less than the significance level. ANOVA used to analyze the differences among means. It applies when there are two or more independent groups. The alternative hypothesis is the means are not all equal. The conclusion is to reject Ho if the F test statistic is greater than F Table or the P-value is less than the significance level.

# RESULTS AND DISCUSSION

This study analyzes student achievement in several subjects by comparing the average scores. Then, identify the constraints during lectures and the learning methods expected by students. The explanation of each is as follows.

1. **Comparison of Scores**

The comparison of the average student scores in each course is presented in Table 1 to Table 4. The comparison test of the average t-test shows that each course has different characteristics. Some values ​​during the Covid-19 pandemic are higher than before the Covid-19 pandemic, or vice versa. The Covid-19 pandemic has had a different impact on student academic achievement in each course.

Table 1 shows the average student score in 3 courses (A1, A2, and A4) during the Covid-19 pandemic has increased from before the pandemic. The t-test with a significance level of 5% concluded that the average value of students in 2 courses significantly increased during the Covid-19 pandemic. For example, for the A1 course, the average student score for the odd semester 2017/2018, odd 2018/2019, and odd 2019/2020 is 62.66. It was increased to 74.24 in odd 2020/2021. The statistical value of the t-test is -5.31, and the P-value is 0.000. Because the P-value is less than 5%, so the conclusion is rejecting Ho. It means that the average value during the Covid-19 pandemic is significantly different and better than before the Covid-19 pandemic. Meanwhile, one course whose grades during the Covid-19 pandemic were lower than before, however, it was not significantly different.

**TABLE 1**. *Comparison of Average Score and the Results of T-test for Basic Material Courses.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course** | **Semester** | **Average Score** | **t Value** | **P Value** |
| **Before Covid** | **During Covid** |
| A1 | 3 | 62.66 | 74.24 | -5.31 | 0.000\* |
| A2 | 1 | 59.10 | 73.04 | -3.39 | 0.001\* |
| A3 | 3 | 73.30 | 71.08 | 1.89 | 0.061 |
| A4 | 1 | 65.05 | 72.50 | -1.97 | 0.055 |

 Note: \*) Significantly different at the 5% significance level

Table 2 shows the comparison of the average score in the courses with the case studies. Impairment of students during the Covid-19 pandemic occurred in three courses (B2, B3, and B4). Based on the t-test, a significant impairment occurred on the subjects of B2 and B3. Meanwhile, the average course increased during the Covid-19 pandemic but was tiny and insignificant.

**TABLE 2**. *Comparison of Average Score and the Results of T-test for Courses with Case Study.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course**  | **Semester** | **Average Score** | **t Value** | **P Value** |
| **Before Covid** | **During Covid** |
| B1 | 7 | 68.35 | 68.78 | -0.09 | 0.928 |
| B2 | 5 | 74.81 | 65.68 | 2.49 | 0.017\* |
| B3 | 7 | 77.06 | 70.44 | 2.28 | 0.026\* |
| B4 | 7 | 75.10 | 73.83 | 0.14 | 0.895 |

Note: \*) Significantly different at the 5% significance level

Table 3 shows the comparison of the average score in the course with the practicum. There are two (C2 and C3) courses that the student scores have decreased during the Covid-19 pandemic. Based on the t-test, the decline in grades in these subjects was not significant. Meanwhile, grades in courses C2, C4, C5, and C6 have increased during Covid-19.

**TABLE 3**. *Comparison of Average Score and the Results of T-test for Courses with Practicum.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course**  | **Semester** | **Average Score** | **t Value** | **P Value** |
| **Before Covid** | **During Covid** |
| C1 | 3 | 72.02 | 69.65 | 1.11 | 0.271 |
| C2 | 3 | 65.17 | 73.28 | -3.14 | 0.002\* |
| C3 | 1 | 69.62 | 69.33 | 0.07 | 0.946 |
| C4 | 5 | 71.43 | 82.63 | -4.98 | 0.000\* |
| C5 | 5 | 63.13 | 67.89 | -1.71 | 0.094 |
| C6 | 1 | 63.24 | 71.61 | -2.18 | 0.035\* |

Note: \*) Significantly different at the 5% significance level

Table 4 shows the comparison of the average scores in the general course or institute identity course. There are three (D1, D3, and D4) courses where the student scores have decreased during the Covid-19 pandemic. Based on the t-test, the decline in grades in the D1 course is significant. Meanwhile, grades in D2 and D5 subjects increased during Covid-19 but were not significant.

**TABLE 4**. *Comparison of Average Score and The Results of T-test for General Courses*.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Course**  | **Semester** | **Average Score** | **Average Score** | **P Value** |
| **Before Covid** | **Before Covid** |
| D1 | 5 | 76.56 | 69.04 | 2.60 | 0.014\* |
| D2 | 1 | 61.78 | 67.05 | -1.58 | 0.12 |
| D3 | 1 | 72.18 | 70.89 | 0.38 | 0.71 |
| D4 | 3 | 81.99 | 80.48 | 0.77 | 0.44 |
| D5 | 3 | 78.53 | 80.78 | -1.28 | 0.20 |

Note: \*) Significantly different at the 5% significance level

1. **Comparison of Student Score ​​based on attendance**

College attendance during the Covid-19 pandemic is higher than before. The higher percentage of student attendance during the Covid-19 pandemic because it is carried out online, which can be done from anywhere. However, attendance still affects the student score. Table 5 shows the comparison of student scores based on their attendance. This one of the case studies courses where the score is lower during the Covid-19 pandemic. It is shown by the data that the students with percentage of attendance are smaller than 80% have average score 36.14. Meanwhile, the students with percentage of attendance are higher than 80% have average score 70.22.

1. **Analysis of Student Constraints in Online Learning**

The B2 course is a type of course with case studies and is held in semester 5. The student scores in this course during the Covid-19 pandemic were lower than before. Based on the survey, the main constraint when studying was an unsupported internet access. It is evidenced by 56% of students, both in Yogyakarta Special Region (DIY) and outside DIY, located in poor internet access. The second highest constraint is self-motivation. Many students (22%) stated that they were less enthusiastic when studying and preferred classroom learning or a combination classroom and online learning. Other constraints were laptop and hand phone facilities, learning media, and cost.

The C2 course is a practicum course where the average student score during the Covid-19 pandemic is higher than before. A survey of students at C2 gave the same results. The student’s constraints in this course were internet access (59%) and self-motivation (13%). Some other constraints are those who are in middle Indonesian time zone (WITA). They sometimes have difficulty managing time, where lectures are scheduled in the west Indonesian time zone (WIB).

Table 5 shows the percentage of students based on activity in B2 courses and their average scores. Most of the students always open the LMS and download materials (47.62%), sometimes study the material before class hours (71.43%), sometimes study the material again after class (71.43%), always discuss with classmates if there is not understood (38.10%), and always re-listening to video records of lecturer materials (52.38%). By comparing the average scores, it can be seen that students who have better grades often open and download material on the LMS, often study material either before or after class hours, often discuss with other students, and also often listen to videos of the lecturer’s material.

Table 6 shows the student opinion about implementing online learning in B2 courses and their average scores. Most of the students stated that the implementation of online learning had gone well. A total of 66.67% of students stated that all activities had been carried out in a structured, scheduled, and coordinated way. A total of 47.62% of students stated that attendance during lectures went well, and the lecturers gave assignments, exams, and assessments. If the average scores are compared, it can be seen that students who have better grades state that the implementation of online lectures has gone very well. Students who attend lectures very well, such as following the lecturer's rules during lectures, always attending according to schedule, doing assignments and exams, paying attention to grades, and evaluating them, will get a good result in this course.

**TABLE 5**. *Percentage of Students Based on Activity in B2 Courses.*

| **Activity** | **Value** | **Always** | **Often** | **Sometimes** |
| --- | --- | --- | --- | --- |
| Open the LMS and download materials | Percentage | 47.62 | 38.10 | 14.29 |
| Average score | 67.45 | 71.03 | 61.87 |
| Study the material before class | Percentage | 9.52 | 4.76 | 71.43 |
| Average score | 65.90 | 66.15 | 65.67 |
| Study the material again after class | Percentage | 0.00 | 14.29 | 71.43 |
| Average score | 0.00 | 66.00 | 65.34 |
| Discuss with classmates if it is not understood | Percentage | 38.10 | 28.57 | 28.57 |
| Average score | 63.31 | 76.35 | 62.83 |
| Always re-listening to video records of lecturer materials | Percentage | 52.38 | 23.81 | 19.05 |
| Average score | 69.90 | 71.10 | 54.30 |

**TABLE 6**. *Student Opinion on The Implementation of Online Learning in B2 Courses.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Activity** | **Very Good** | **Good** | **Poorly** |
| **Percentage** | **Average score** | **Percentage** | **Average score** | **Percentage** | **Average score** |
| All activity | 28.57 | 67.35 | 66.67 | 67.20 | 0.00 | 0.00 |
| Attendance | 42.86 | 68.61 | 47.62 | 68.51 | 9.52 | 62.90 |
| Assignments, exams, and assessments | 47.62 | 70.03 | 47.62 | 68.78 | 4.76 | 40.25 |

1. **Choice of Learning Methods During Covid-19 Pandemic**

A total of 72% of students who study in B2 course choose classroom learning in the next period. Meanwhile, 10% of students choose online learning and 19% choose a combination of classroom and online learning. The first reason they choose classroom learning is that interaction between lecturers and students is active. Second, the material delivered by the lecturer is more acceptable because networks and other things do not constraint it. The lecturer knows the level of understanding students about the material. The atmosphere learning is better, focused, conducive, and able to interact among students.

Students choose online learning or a combination of them because they are worried about the Covid-19 pandemic that has not subsided. They can improve study activity anytime and everywhere. They understand the material by listening to video records of lecturers. The average score of students who choose a combination of classroom and online learning is 73.55 higher than students who chose classroom learning. Meanwhile, the average score in classroom learning is 68.54 and in online learning is 52.95.

A total of 59% of students in the C2 course choose classroom learning. Meanwhile, 10% of students choose online, and 31% of students choose a combination. The reason for this selection is the same as the reason in the B2 course. Other reasons for choosing a combination are that students and lecturers are forced to adapt to the existence of both systems. Besides that, the Covid-19 pandemic and economic conditions are still uncertain.

Regarding learning media, students in B2 and C2 courses stated that Zoom Meeting and LMS were still an option (93%). However, there will still be problems when the internet does not support it. The alternative is to use Google Meet, Google Drive, or WhatsApp groups for communication.

1. **Factors that Affecting Student Score**

The students score in the B2 course during the Covid-19 pandemic is significantly lower than before. Table 7 shows that the pandemic has significantly affected student achievement in this course. Therefore, this study conducted a follow-up analysis to determine other factors that affected it. These factors are the location at the learning time, the main constraints to the course, and the learning activity.

The learning activity by re-listening the video records of the lecturer’s material is the most influential thing. It is indicated by the P-value of the ANOVA test, which is less than the 10% significance level. Other factors, such as the location, the main constraints to studying, and how to learn by opening and downloading materials in the LMS, studying the material before and after class hours, and discussing with other students had no significant effect.

**TABLE 7**. *ANOVA Results About Factor That Affecting Student Score in B2 Course.*

|  |  |  |
| --- | --- | --- |
| **Factor** | **F Value** | **P Value** |
| Location of students | 0.35 | 0.562 |
| The main constraints to studying | 0.79 | 0.516 |
| Opening and downloading materials in the LMS | 0.27 | 0.765 |
| Studying the material before class | 1.61 | 0.227 |
| Studying the material after class | 1.43 | 0.266 |
| Discuss with other students | 2.43 | 0.118 |
| Re-listening to the video records of the lecturer’s material | 2.79 | 0.089\* |

Note: \*) Significantly different at the 10% significance level

There are two limitations in this study, namely resources and time. With the support of better resources and a longer time, this research can be expanded to obtain a larger sample and a wider area coverage. The limited time did not allow researchers to apply additional data collection methods, such as interviews to increase the completeness and strength of the data collected through a survey questionnaire.

#  CONCLUSION

The Covid-19 pandemic has affected the academic achievement of students at IST AKPRIND Yogyakarta. Nevertheless, a form of influence is different and various, especially on student course scores. This study uses the comparison of the average student scores in the sample course. The average scores during the Covid-19 in some courses were higher than before, or vice versa. The Covid-19 pandemic has a different impact on student academic achievement in each course. Based on the t-test, the student scores in 2 basic material types of study programs were significantly higher during the Covid-19 pandemic. During the Covid-19 pandemic, there were 2 case study courses whose average scores were much lower. There is an average student score in 3 practicum types of courses significantly higher during the Covid-19 pandemic. There is an average student score in 1 general course, which is significantly lower during the Covid-19 pandemic.

Based on a sample of students whose average scores were lower during the Covid-19 pandemic, it can be seen that most students had problems with internet access and self-motivation. Students who have limited access of internet could not follow the learning process easily that made them difficult to understand the materials given and lead them to be less motivated. As a results, those students could not get the maximal grades. In the other side, students who have better grades often open and download material on LMS, study material before or after class hours, discuss with other students, and listen to videos of the lecturer’s material. Furthermore, students who attend lectures very well, such as following the rules of the lecturer during learning process, attending the course as scheduled, doing assignments and exams, and paying attention of their grades and evaluating them, will facing a good achievement. Based on the ANOVA test, a significant factor affecting student scores during the Covid-19 pandemic is how to learn by re-listening to video records of the lecturer’s material.

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# References

1. E. Naryono, *Impact of National Disater Covid-19, Indonesia Toward Economic Recession*. (2020).

2. H. S. Cahyadi and D. Newsome, International Journal of Geoheritage and Parks (2021).

3. M. D. H. Rahiem, Child Abuse & Neglect **118**, 105168 (2021).

4. H. Wahyono, B. S. Narmaditya, A. Wibowo and J. Kustiandi, Heliyon **7** (7), e07400 (2021).

5. R. Agnoletto and V. Queiroz, *COVID-19: moving from the classroom to the virtual environment*. (2020).

6. M. Siahaan, Dampak Pandemi Covid-19 Terhadap Dunia Pendidikan **20** (2) (2020).

7. I. Alyoussef, Frontiers in Education **6** (194) (2021).

8. C. Torres-Martín, C. Acal, M. Homrani and Á. Mingorance Estrada, Sustainability **13**, 582 (2021).

9. K. K. Sahoo, K. K. Muduli, A. K. Luhach and R. C. Poonia, Journal of Statistics and Management Systems **24** (2), 341-355 (2021).

10. F. Firman, BIOMA: Jurnal Biologi dan Pembelajarannya **2** (1), 14-20 (2020).

11. S. Burgess and H. H. Sievertsen, VoxEu. org **1** (2) (2020).

12. L. R. Amir, I. Tanti, D. A. Maharani, Y. S. Wimardhani, V. Julia, B. Sulijaya and R. Puspitawati, BMC medical education **20** (1), 1-8 (2020).

13. T. Tafdhila, L. Marleni and A. Saputra, Jurnal Perawat Indonesia **5** (1), 576-584 (2021).

14. I. G. Purnawinadi, Jurnal Skolastik Keperawatan **7** (1), 63-69 (2021).