



# A Development of SI-PINTAR Apps Utilized Web Based Technology to Investigate the COVID-19 Transmission Preventive Behaviour for High School Students

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**Abstract.** The COVID-19 pandemic caused a significant global impact on public health and society, resulting in a high transmission rate and affected various sectors such as the economy, social, and education. To mitigate the impact on education, institutions need to implement health protocols to protect students. This study aims to develop a COVID-19 Transmission Prevention Application and investigate its influence on the behavior of high school students. This research was conducted to support the remote Educational Institution to prevent their students from COVID-19 transmission during pandemic. This study utilized two designs: R&D and Quasi-Experimental Pretest-Posttest Control Group Design. The population of this study consisted of 267 students from SMK NU Sunan Ampel Poncokusumo, Malang Regency. A sample of 60 respondents was randomly selected using random sampling method and divided to 3 group: applications and modules treatment group (A), applications treatment group (B), and the control group (C). The data collected was analyzed using One Way ANOVA test. The study show, there is a significant difference between group A, B and C increasing the value of student's behavior regarding the prevention of the Covid-19 ( $F(2, 57) = [59.956], p=0.00$ ). This study concludes that providing the Covid-19 Transmission Prevention Application to the students was highly effective compared to those who did not receive the application. SI-PINTAR Apps can be applied for High School students as a screening tools and as a prevention behaviour measurement.

**Keywords:** Covid-19, Prevention, Application, Student.

## 1 Introduction

Global public health and society have been greatly impacted by the COVID-19 pandemic, which was brought on by the severe acute respiratory syndrome corona-virus 2 (SARS-CoV-2). The virus quickly spread across the world after emerging in late 2019 and causing a pandemic. Healthcare systems and communities all across the world faced formidable problems as a result of SARS-CoV-2's high rate of transmission [1–3]. Due to its negative influence, Covid-19 has harmed many sectors include education [4, 5]. While early studies suggested that young people were less likely to develop severe symptoms than other age groups, a study indicated that children are as like-ly as

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adults to develop COVID-19 [3, 6, 7]. Preventing COVID-19 transmission among students is crucial for safeguarding their health and well-being, minimizing the risk of severe illness and long-term complications [5, 8]. It also plays a vital role in limiting the spread of the virus in the broader community and protecting vulnerable populations from potential harm. Moreover, by preventing transmission, schools can maintain educational continuity, ensuring that students can continue their academic progress, personal development, and access future opportunities, either through in-person or remote learning strategies, without significant disruptions.

The COVID-19 epidemic has prompted a comprehensive international reaction. Widespread testing, contact tracking, quarantine measures, and the creation and distribution of vaccinations have all been used to try and stop the virus's spread [9, 10]. Organizations such as the World Health Organization (WHO), the US Centers for Disease Control and Prevention (CDC), and the European Centre for Disease Prevention and Control (ECDC) have provided comprehensive covid intervention guidelines such as hand hygiene, respiratory etiquette, use of personal protective equipment (PPE), cleaning and disinfection protocols, and safe practices for healthcare settings and public spaces [11]. Beside Health Protocol, health promotion may paradoxically be more important in this time of crisis than ever before. As a discipline within public health and a field of professional practice, health promotion can contribute to addressing the CoV-2 virus threat at different levels 2020 [2, 11, 12]. Whereas, Health education is recognized as a discipline focused on guiding and organizing educational processes to improve health outcomes through a combination of information and education activities [13].

With the acceleration of technology driven by the COVID-19 pandemic, health education media has also experienced growth. One of them is education through internet-based applications. The use of the internet and smartphones has been extensively studied and proven effective in improving the health status of the community [14, 15]. Internet access facilitates people in searching for specific information and engaging in targeted learning. Information retrieval is predominantly dominated by internet utilization through smartphones [16, 17]. This trend presents an opportunity for healthcare practitioners to disseminate health information [13]. The COVID-19 Transmission Prevention Application is an application used to provide health information or health education regarding COVID-19 and COVID-19 Transmission Prevention Methods [15, 18]. The COVID-19 Transmission Prevention Application is utilized to provide health education to the community in preventing the transmission of COVID-19. Moreover, it can be used by the public to educate their families to consistently adhere to health protocols and engage in COVID-19 prevention in their respective areas [12, 13, 19, 20]

Research on the impact of applications on COVID-19 prevention is still limited. Specifically, there is a need to explore how this approach can be implemented. This study aims to develop the COVID-19 Transmission Prevention Application and determine the influence of using the application on the behavior of high school students.

## 2 Research Methods

This study used 2 research designs. The first phase used the Research and Development (R&D) approach consisting of: Develop preliminary form of product (SI-PINTAR & Modul), Expert Consideration, Preliminary field testing, main product revision, Implementation. The second phase used a Quasi-Experimental design (Pretest-Posttest Control Group Design).

The population of this study consisted of 267 students from SMK NU Sunan Ampel Poncokusumo, Malang Regency. A sample of 60 respondents was randomly selected using random sampling method, with the following details:

The study began by developing an Application and Module using the R&D process. After the modules and application were prepared, informed consent was distributed to the respondents, who were divided into three groups. Pretests on knowledge and behavior regarding COVID-19 transmission prevention were conducted for all groups. Subsequently, education was provided to groups A and B. One week later, post-tests on knowledge and behavior regarding COVID-19 transmission prevention were administered to all groups. The data collected was analysed using univariate analysis (preposttest) and bivariate analysis (One Way ANOVA test).

## 3 Results and Discussion

This study examined the effects of three different treatments on students' behavior regarding the prevention of the Covid-19 virus. The observed intervention were (1) Education with application and module, (2) Education with an application, and (3) control group.

### 3.1 Result

**Descriptive Analysis.** Table 1 shows that Group A, which received the treatment of an application and module, consisted of 20 respondents. The descriptive results of the students' behavior scores regarding Covid-19 virus prevention before the treatment (pre-test) showed a mean score of 59.50 with a standard deviation of 4.56. After the treatment (post-test), the mean score was 91.25 with a standard deviation of 4.83. These results indicate an improvement in the behavior scores of SMK NU Sunan Ampel Poncokusumo students with an average increase of 31.75.

**Table 1.** Descriptive Results of the Behavior of SMK NU Sunan Ampel Poncokusumo Regarding Covid-19 Prevention

No.	Test	Group A		Group B		Group C	
		Mean	SD	Mean	SD	Mean	SD
1.	Pretest	59.50	4.56	62.25	4.72	67.50	13.91
2.	Posttest	91.25	4.83	90.00	3.97	77.25	15.68

Group B, which received the treatment of an application, consisted of 20 respondents. The descriptive results of the students' behavior scores regarding Covid-19 virus prevention before the treatment (pre-test) showed a mean score of 62.25 with a standard deviation of 4.72. After the treatment (post-test), the mean score was 90.00 with a standard deviation of 3.97. These results indicate an improvement in the students' behavior scores with an average increase of 27.75.

The control group, consisting of 20 respondents, received the control treatment. The descriptive results of the students' behavior scores regarding Covid-19 virus prevention before the treatment (pre-test) showed a mean score of 67.50 with a standard deviation of 13.91. After the treatment (post-test), the mean score was 77.25 with a standard deviation of 15.68. These results indicate an improvement in the students' behavior scores with an average increase of 9.75.

**ANOVA Test.** The Analysis of Variance (ANOVA) test was used to examine the differences among the three treatment groups used in this study, which aimed to compare students' behavior regarding the prevention of the Covid-19 virus using the following treatments: (1) application and module intervention, (2) application intervention, and (3) control group.

Normality and homogeneity tests were conducted as prerequisites for the ANOVA test. The test results indicated that the requirements for normality and variance homogeneity were met, allowing the use of the ANOVA test, with the following results.

**Table 2.** ANOVA Test Result

No	Group	Mean	SD	F value	Sig.
1	Apps + Moduls	31.75	4.67	59.956	0.000
2	Apps	27.75	6.17		
3	Control	9.75	8.81		

Table 2 demonstrate about The ANOVA test results comparing the effects of the application and module intervention, the application intervention, and control group on the improvement of students' behavior regarding the prevention of the Covid-19 virus resulted an F-value of 59.956 with a significance value of 0.000. For comparison, the critical F-value at a 5% significance level, with degrees of freedom of 2 and 57, was 3.159. These results indicate that the F-value is greater than the F critical and the significance value is less than 0.05 ( $\text{sig} < 0.05$ ), indicating a significant difference among the application and module treatment, application treatment, and control treatment regarding the improvement of students' behavior on the prevention of the Covid-19 virus.

Based on the description, it is evident that the application and module treatment had the greatest influence on the improvement of students' behavior regarding the prevention of the Covid-19 virus compared to the other treatments. Thus, this treatment can be considered the most effective in enhancing students' behavior regarding the prevention of the Covid-19 virus.

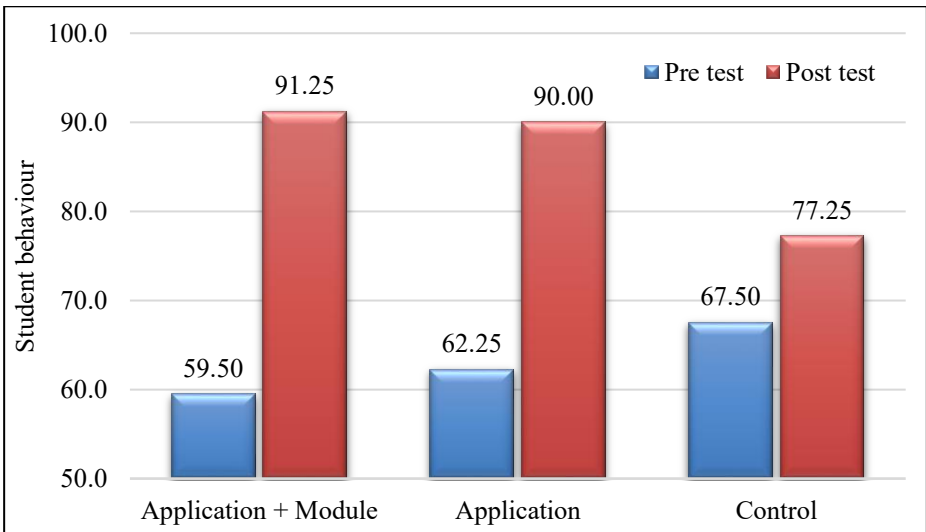
**Table 3.** LSD Test Results: Comparison between the Application and Module intervention and the Application intervention

No	Group	Mean	SD	Sig.
1	Apps + Moduls	31.75	4.67	0.067
2	Apps	27.75	6.17	

Table 3 shows that Post-hoc LSD (Least Significance Different) test was used to compare the two treatment groups: the application and module treatment and application treatment. The test results showed a significance value of 0.067, indicating that the significance value is greater than 0.05 (sig > 0.05). Therefore, it can be concluded that there is no significant difference between application and module treatment and the application treatment regarding students' behavior regarding the prevention of the Covid-19 virus (Fig. 1).

**Table 4.** LSD Test Results: Comparison between the Application and Module treatment and the Control group

No	Group	Mean	SD	Sig.
1	Apps + Moduls	31.75	4.67	0.000
2	Control	9.75	8.81	



**Fig. 1.** Differences in student behavior of SMK NUSA between Groups A, B and C.

Table 4 shows that Post-hoc LSD test was used to compare the two treatment groups: the application and module treatment and the control treatment. The test results resulted a significance value of 0.000, indicating that the significance value is less than 0.05 (sig

< 0.05). Therefore, it can be concluded that there is a significant difference between the application and module treatment and the control group regarding students' behavior regarding the prevention of the Covid-19 virus.

**Table 5.** LSD Test Results: Comparison between the Application Treatment and the Control group

No	Group	Mean	SD	Sig.
1	Apps	27.75	6.17	0.000
3	Control	9.75	8.81	

Table 5 shows Post-hoc LSD test was used to compare the two treatment groups: the application treatment and the control treatment. The test results resulted a significance value of 0.000, indicating that the significance value is less than 0.05 (sig < 0.05). Therefore, it can be concluded that there is a significant difference between application treatment and the control treatment regarding students' behavior regarding the prevention of the Covid-19 virus.

**Assessment of Application Development.** The assessment of respondents towards the application development was conducted by providing ratings ranging from 1 (poor) to 4 (excellent). The assessment results were presented using descriptive analysis, including frequency and percentage, based on the research data with the following outcomes.

**Table 6.** Assessment of Application Development

No	Group	Very Good	Good	Average	Poor
1	Apps + Moduls	20 (100%)	-	-	-
2	Apps	20 (100%)	-	-	-
3	Control	17 (85%)	3 (15%)	-	-

Table 6 shows that for the group of respondents who received the treatment with the application and module, all of them gave an excellent rating, totaling 20 individuals. Similarly, for the group of respondents who received the treatment with the application, all of them also gave an excellent rating, totaling 20 individuals. As for the group of respondents who received the control group, 17 individuals gave an excellent rating, while 3 individuals gave a good rating.

### 3.2 Discussion

The study show, there is a significant difference between the applications and modules treatment group, applications treatment group, and the control group of increasing the value of student's behavior regarding the prevention of the Covid-19 ( $F(2, 57) = [59.956]$ ,  $p = 0.00$ ). From Post Hoc LSD Test, it can be concluded that there is no significant difference between application and module treatment and the application

treatment regarding students' behavior regarding the prevention of the Covid-19 virus ( $P=0,067$ ), and there is a significant difference between the application and module treatment with the control treatment, and application treatment with the control treatment regarding students' behavior regarding the prevention of the Covid-19 virus.

The effectiveness of using the Covid-19 Transmission Prevention Application among students from SMK NU Sunan Ampel Poncokusumo was implemented throughout the school environment. The results, after being presented to the students from SMK NU Sunan Ampel Poncokusumo who were divided into three treatment groups, showed that 57 students rated the Covid-19 Transmission Prevention Application as very good, while 3 students rated it as good. Regarding the evaluation of the behavior of students from SMK NU Sunan Ampel Poncokusumo regarding the prevention of Covid-19 transmission, it was found that providing the Covid-19 Transmission Prevention Application to the students was highly effective compared to those who did not receive the application.

The result in line with previous study [13, 21–23] The conclusion indicated the effectiveness of online media in health promotion in increasing knowledge, attitudes, and healthy behavior among adolescents. According to previous research, education will have a good effect if the process of delivering health education uses good media [9, 21, 24]. Applications are media that are interesting to use, easy to understand, and in accordance with the needs of high school youth [15, 16, 18, 25, 26].

The Covid-19 Transmission Prevention Application can be used to monitor the health condition of students before attending classes each day, enabling anticipatory measures to be taken if any students are at risk or show signs of health disorders related to Covid-19. In addition to being used by students, the application can also be implemented for all staff, teachers, and the school environment as a preventive measure against Covid-19 transmission at SMK NU Sunan Ampel Poncokusumo.

It is recommended to provide the Covid-19 Transmission Prevention Application to students at the beginning of each week, allowing the monitoring of students' health conditions before attending classes each day and enabling anticipatory measures to be taken if any students are at risk or show signs of symptom related to Covid-19. In addition to students, it is advisable to implement the application for all staff, teachers, and the school environment to anticipate the occurrence of Covid-19 transmission at SMK NU Sunan Ampel Poncokusumo.

## 4 Conclusion

Based on the research findings, it is evident that the application and module intervention had the highest improvement in the behavior of students from SMK NU Sunan Ampel Poncokusumo regarding the prevention of Covid-19. This is indicated by an average increase in scores of 31.75, with a pre-test score of 59.50 and a post-test score of 91.25. The application treatment had the second highest improvement, with an average increase in scores of 27.75, from a pre-test score of 62.25 to a post-test score of 90.00. Among the three treatments, the control group showed the lowest improvement, with an average increase in scores of 9.75, from a pre-test score of 67.50 to a post-test score

of 77.25. These results suggest that the development of the application, accompanied by a module, can be implemented to achieve optimal results in improving the behavior of students from SMK NU Sunan Ampel Poncokusumo regarding the prevention of Covid-19.

## References

1. Hu B, Guo H, Zhou P, Shi ZL (2021) Characteristics of SARS-CoV-2 and COVID-19. *Nat Rev Microbiol* 19:141–154. <https://doi.org/10.1038/s41579-020-00459-7>
2. E G (2020) Exaggerated risk of transmission of COVID-19 by fomites. *Lancet Infect Dis* 20:892–893. [https://doi.org/10.1016/S1473-3099\(20\)30561-2](https://doi.org/10.1016/S1473-3099(20)30561-2)
3. Johansson MA, Quandelacy TM, Kada S, et al (2021) SARS-CoV-2 Transmission from People without COVID-19 Symptoms. *JAMA Netw Open* 4:1–8. <https://doi.org/10.1001/jamanetworkopen.2020.35057>
4. Gray DJ, Kurscheid J, Mationg ML, et al (2020) Health-education to prevent COVID-19 in schoolchildren: a call to action. *Infect Dis Poverty* 9:81. <https://doi.org/10.1186/s40249-020-00695-2>
5. Brivio F, Fagnani L, Pezzoli S, et al (2021) School Health Promotion at the Time of COVID-19: An Exploratory Investigation with School Leaders and Teachers. *Eur J Investig Heal Psychol Educ* 11:1181–1204. <https://doi.org/10.3390/ejihpe11040087>
6. Lot M, Hamblin MR, Rezaei N (2020) Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information
7. ADAM D (2022) THE PANDEMIC'S TRUE DEATH TOLL: MILLIONS MORE THAN OFFICIAL COUNTS. *Nature* 602(7893):312–5
8. Wirtz VJ, Millán-Garduño G, Hegewisch-Taylor J, et al (2023) Misinformation messages shared via WhatsApp in Mexico during the COVID-19 pandemic: an exploratory study. *Health Promot Int* 38:daad041. <https://doi.org/10.1093/heapro/daad041>
9. García-Toledano E, López-Parra E, Cebrián-Martínez A P-RA (2022) The Need for Health Education and Vaccination-Importance of Teacher Training and Family Involvement. *Healthc (Basel, Switzerland)* 10:110. <https://doi.org/10.3390/healthcare10010110>
10. van den Broucke S (2021) Why health promotion matters to the COVID-19 pandemic, and vice versa. *Health Promot Int* 35:181–186. <https://doi.org/10.1093/HEAPRO/DAAA042>
11. Islam MS, Rahman KM, Sun Y, Qureshi MO, Abdi I, Chughtai AA SH (2020) Current knowledge of COVID-19 and infection prevention and control strategies in healthcare settings: A global analysis. *Infect Control Hosp Epidemiol* 41:1196–1206. <https://doi.org/10.1017/ice.2020.237>
12. Menni, C., Valdes, A.M., Freidin MB (2020) Real-time tracking of self-reported symptoms to predict potential COVID-19. *Nat Med* 26:1037–1040.



- <https://doi.org/10.1038/s41591-020-0916-2>
13. (2017) Promosi kesehatan menggunakan gambar dan teks dalam aplikasi WhatsApp pada kader posbindu. *Ber Kedokt Masy* 33:547. <https://doi.org/10.22146/bkm.26070>
  14. Wityadarda C, Andani GASD, Rostarina R (2021) A review of Internet-based approaches for health promotion programs related to the COVID-19 pandemic and wellness education. *J Community Empower Heal* 3:56. <https://doi.org/10.22146/jcoemph.57084>
  15. Sun S, Folarin AA, Ranjan Y, et al (2020) Using smartphones and wearable devices to monitor behavioral changes during COVID-19. *J Med Internet Res* 22:1–19. <https://doi.org/10.2196/19992>
  16. Swayamsiddha S, Mohanty C (2020) Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information
  17. Wu J, Wang J, Nicholas S, et al (2020) Application of big data technology for COVID-19 prevention and control in China: Lessons and recommendations. *J Med Internet Res* 22:. <https://doi.org/10.2196/21980>
  18. Naik N, Hameed BMZ, Sooriyaperakasam N, Vinayahalingam S, Patil V, Smriti K, Saxena J, Shah M, Ibrahim S, Singh A, Karimi H, Naganathan K, Shetty DK, Rai BP, Chlosta P SB (2022) Transforming healthcare through a digital revolution: A review of digital healthcare technologies and solutions. *Front Digit Heal* 4:919985. <https://doi.org/10.3389/fdgth.2022.919985>
  19. Al Hakim RR (2020) Pencegahan Penularan Covid-19 Berbasis Aplikasi Android Sebagai Implementasi Kegiatan KKN Tematik Covid-19 di Sokanegara Purwokerto Banyumas. *Community Engagem Emerg J* 2:7–13. <https://doi.org/10.37385/ceej.v2i1.125>
  20. (2022) PEMANFAATAN MEDIA ONLINE SEBAGAI SARANA EDUKASI KESEHATAN PADA REMAJA : TINJAUAN LITERATUR. *PREPOTIF J Kesehat Masy* 6:564–574. <https://doi.org/10.31004/prepotif.v6i1.3110>
  21. Widiasih R, Mamuroh L, Mujahidah G, et al Efektifitas Edukasi Kesehatan menggunakan Aplikasi KESTURI terhadap Deteksi Dini Kanker Media Karya Kesehatan : Volume 5 No 2 November 2022 Pendahuluan Kesehatan perempuan memiliki peranan penting karena perempuan yang akan melahirkan generasi yang berkua. 5:127–136
  22. Saeidnia HR, Ausloos M, Mohammadzadeh Z, Babajani A HM (2022) Mobile-Based Self-Care Application for COVID-19: Development Process Using the ADDIE Model. IOS Press
  23. Cheema S, Ameduri M, Abraham A, Doraiswamy S MR (2020) The COVID-19 pandemic: the public health reality. *Epidemiol Infect* 148:e223. <https://doi.org/10.1017/S0950268820002216>
  24. Wang Q, Su M, Zhang M, Li R (2021) Integrating digital technologies and public health to fight covid-19 pandemic: Key technologies, applications, challenges and outlook of digital healthcare. *Int J Environ Res Public Health* 18:. <https://doi.org/10.3390/ijerph18116053>

25. Heo K, Lee D, Seo Y, Choi H (2020) Searching for digital technologies in containment and mitigation strategies: Experience from south korea covid-19. *Ann Glob Heal* 86:1–10. <https://doi.org/10.5334/AOGH.2993>
26. Alghamdi NS AS (2022) The Role of Digital Technology in Curbing COVID-19. *Int J Environ Res Public Health* 19:8287. <https://doi.org/10.3390/ijerph19148287>

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