

## Covid-19 Pandemic: Impact on skill improvement of the Indonesian teachers in using online learning applications

Zuardin<sup>1\*</sup>, Al-Azhar<sup>2</sup>

<sup>1</sup>UIN Sunan Ampel Surabaya, Indonesia

<sup>2</sup>LPPPTK KPTK, Ministry of Educational and Culture, Indonesia

\*Correspondence: [ardinph@gmail.com](mailto:ardinph@gmail.com)

### ABSTRACT

The Covid-19 outbreak was first confirmed to have infected 2 Indonesians on March 2, 2020. Indonesian schools began to close in mid-March, face-to-face teaching, and the learning process turned into online learning. Since then, the use of online learning applications increased significantly. The objective of this study was to investigate the benefits of using online learning applications for Indonesian teachers. Data collection by distributing online questionnaires in Google form to teachers joining online training, online exam preparation questions organized by the LPPPTK KPTK, opened the link on May 14 and closed on May 27, 2020. 911 participants giving responses came from 32 provinces of 34 in Indonesia. Data were processed with SPSS software version 26.0. A univariate analysis was chosen to describe the frequency distribution and percentage of each variable. Spearman's correlation coefficient,  $r$ , was used to evaluate the association among the variables, and a two-tailed  $p < 0.05$  was considered the statistically significant relationship between sample characteristics, the benefit of online training substance, and the developing teacher skills in using several online learning applications during the Covid-19 pandemic. Respondent areas mapping used geographic information system (GIS), assisted by ArcGIS 10.3 software. The results confirmed that 748 (82.11%) teachers said that more learning applications were mastered during the pandemic compared to before Covid-19 infection. The gender, education, school level, and region didn't influence skill improvement in using online learning applications. But it was largely determined by the online training substance, the significance value  $< 0.05$ , and the degree of relationship 0.90.

### ARTICLE HISTORY

Published December 08<sup>th</sup> 2021



### KEYWORDS

Covid-19; Geographic Information System (GIS); Online Learning Applications; Teacher Skill

### ARTICLE LICENCE

© 2021 Universitas Hasanuddin Under the license CC BY-SA 4.0



### 1. Introduction

Teachers are professional educators having an important role to educate and guide students (Bardach & Klassen, 2020) and to improve the quality of education of a nation (Jennings et al., 2019). As an educator, a teacher can teach a particular field of science to his students in the classroom (Andreasen et al., 2019; Bostwick et al., 2020); a teacher can master the class and control misbehavior students, aggressive student behavior, lack of effective consequences, and behavioral health problems (Camacho & Parham, 2019); and a teacher can guide their students to be smart and successful (Bardach & Klassen, 2020). During the learning process, teachers are expected to be able to control emotions and stress levels due to problems, because it affects negatively the educational quality and low-performance schools (Corbin et al., 2019).

Based on the learning perspective, the teacher always acts as a motivator, provides adequate support (Dietrich et al., 2015) and fosters students creativity (Kupers & van Dijk, 2020); as an evaluator, provides an assessment of the cognitive abilities and achievements of their students (Gentrup et al., 2020; McFadden & Williams, 2020); as an administrator, its relationship with school administration (Zavelevsky & Lishchinsky, 2020).

Teachers' rights and obligations in Indonesia are regulated in Law number 14 of 2015. The teachers have the right to earn an income above the minimum necessities of life and social welfare guarantees, the opportunity to improve academic qualifications and competencies, and participate in training and professional development in their fields, including school-based teacher collaboration (de Jong et al., 2019). Obligations of teachers include planning learning, implementing quality learning processes, and assessing and evaluating learning outcomes. The workload of the teacher in implementing the learning process is at least 24 hours face to face in 1 week.

Indonesia's education sector is one of the sectors affected by the Covid-19 pandemic. Covid-19 was first announced by President Joko Widodo on March 2, 2020 (Djalante et al., 2020). One month later, the number of infected cases increased to 1790, with 170 dead and 112 recovering (Djalante et al., 2020). As of May 29 (2020), 216 countries globally were exposed to Covid-19, with a positive number of 5,657,529 people, and 356,254 people died. In Indonesia, the number of cases of Covid-19 infection was 25,216 people, cured 6,492 people, and died 1,520 people (<http://covid19.go.id/>). To prevent rapid Covid-19 transmission, the Indonesian government implemented a policy of working from home (WFH), social distancing, and physical distancing. Formal education facilities, schools starting in kindergarten, elementary, junior high, high school / vocational school are closed. The face-to-face learning process cannot be carried out, replaced by online-based learning. Teachers' communication with students are done online. For the development of their professional developments (Osman & Warner, 2020), teachers attend online-based training held by government training institutions.

Although online learning has many obstacles, for example, the mastery of technology is still low, limited facilities and infrastructure e.g. rural schooling (Li et al., 2020), internet network constraints, and additional costs, but this technology forces teachers to be able to operate online learning well. During the Covid-19 pandemic, the use of online learning applications increased significantly. This study aims to investigate the benefits of using online learning applications for teachers in Indonesia.

## **2. Literature Review**

Several Covid-19 studies had been carried out, both from a health review and the impact on various countries (Bruinen de Bruin et al., 2020). For example, Covid-19 patients were at risk because of underlying diseases, including hypertension, respiratory system disease, and cardiovascular disease (Yang et al., 2020). Covid-19 transmission patterns that generally occur in urban areas, where the epicenter is the beginning of the spread of the virus and then form new clusters in the surrounding areas (Liu, 2020). Older people are more vulnerable to Covid-19 infection than young people (Niu et al., 2020).

Covid-19 pandemic impacts on global socioeconomic aspects, including a reduced workforce across all economic sectors, schools are temporarily closed, the need for commodities and manufactured products has decreased (Nicola et al., 2020), and it affects stock market outcomes (Al-Awadhi et al., 2020). In the social aspect, social distancing affects the incidence of certain crimes in Los Angeles and Indianapolis (Mohler et al., 2020), it influences the mental health (Hagerty & Williams, 2020). Covid-19 outbreak impacts on the environment (Chakraborty & Maity, 2020; Saadat et al., 2020), including better air conditions during the pandemic compared to before the Covid-19 transmission (Kerimray et al., 2020; Nakada & Urban, 2020).

Sintema (2020) examines the Covid-19 effect on the performance of Grade 12 Students in Zambia. His research states that the Covid-19 pandemic could influence student graduation rates on national examinations this year. Besides, Covid-19 can also have an impact on the closure of educational facilities (Ali & Alharbi, 2020) and the mental health of students and academic staff (Sahu, 2020), affecting the psychology of college students (Cao et al., 2020).

In the education sector, the health crisis caused by Covid-19 pandemic has spearheaded online lessons simultaneously (Goldschmidt, 2020). Supported by technological developments that are not limited to the current 4.0 industrial revolution. Online learning is effective for implementing learning even though educators and students are in different places (Verawardina et al., 2020). The sudden Pandemic COVID-19 requires an educational element to sustain online learning. The current condition urges innovation and adaptation related to the use of available technology to support the learning process (Ahmed et al., 2020). The practice requires educators and students to interact and transfer knowledge

online. Online learning can take advantage of platforms in the form of applications, websites, social networks, and learning management systems (Gunawan & Fathoroni, 2020). These various platforms can be utilized to support knowledge transfer supported by various discussion techniques and others.

Several studies had been conducted regarding the impact of the Covid-19 pandemic that affected the education sector, including the closure of schools (educational facilities), the psychological impact on students, and the change in learning systems from face-to-face to online learning. However, studies on the continued impact of online learning on teachers during the Covid-19 pandemic period were still very minimal to be studied. Therefore, this research tried to investigate how the use of online learning affects the improvement of teacher skills in using online applications.

Online learning is defined as the experience of knowledge transfer using video, audio, images, text communication, software (Basilaia & Kvavadze, 2020) and with the support of internet networks (Zhu & Liu, 2020). This is a modification of knowledge transfer through website forums (Basilaia & Kvavadze, 2020) and digital technology trends as a hallmark of the industrial 4.0 revolution to support learning during the COVID-19 pandemic. Technology integration and various innovations are characteristic of online learning (Banggur et al., 2018). Besides, the most important thing is the readiness of educators and students to interact online.

The infrastructure that supports online learning for free through various discussion rooms such as Google Classroom, Whatsapp, Smart Class, Zenius, Quipper, and Microsoft (Abidah et al., 2020). Whatsapp features include Whatsapp Group which can be used to send text messages, images, videos, and files in various formats to all members (Firman et al., 2020; Kusuma & Hamidah, 2020). Google Classroom also allows educators and teachers to develop creative learning.

### **3. Methods**

#### **3.1 Data collections**

Respondents in this study were teachers joining online training, online exam preparation questions organized by the LPPPTK KPTK (Lembaga Pengembangan dan Pemberdayaan Pendidik dan Tenaga Kependidikan Bidang Kelautan Perikanan Teknologi Informasi dan Komunikasi, the ministry of education and culture, Indonesia conducted on April 28 to May 14, 2020. Teachers were one of the social groups affected by the Covid-19 pandemic.

The study instruments used were an online structured questionnaire designed in Google form which was anonymous to ensure the confidentiality and reliability of the data. This online questionnaire that was shared with all trainees opened the link on May 14, and closed on May 27, 2020, contains demographic information, consisting of gender, education level, school level, and region. They were also asked to disclose the reasons for taking part in online training and the benefits gained after taking part in online training during the pandemic, both in substance for the preparation of online exam questions and the use of online learning applications. There were 911 participants giving responses, came from 32 provinces of 34 in Indonesia.

#### **3.2 Data analysis**

Data were processed with *Statistical Package for the Social Sciences* (SPSS) software version 26.0. An analysis of descriptive statistics was worked to describe the results of data collection and identify the characteristics of respondents. A univariate analysis (nonparametric test) was chosen to describe the characteristics of each variable to produce a frequency distribution and percentage of each variable. The next step explored a significant relationship between sample characteristics, the benefit of online training substance, and the developing teacher skills in using several online learning applications during the Covid-19 pandemic (Abdellatif et al., 2020; Cao et al., 2020). Spearman's correlation coefficient,  $r$ , was used to evaluate the association among the variables to skill improvement of the Indonesian teacher in using online learning applications. A two-tailed  $p < .05$  was considered statistically significant.

Respondent areas mapping used geographic information system (GIS), assisted by ArcGIS 10.3 software. To facilitate the description on the map, the distribution of respondents was simplified into 4 classes based on the number of participants in all provinces, 0-5%, 5-10%, 10-15%, and 15-20%.

## 4. Results

### 4.1 Respondents' characteristics

Based on univariate analysis results, obtained from a total of 911 respondents, consisting of 622 women (68.3%) and 289 men (31.7%). The level of education from diploma to master (S2), where diploma education was 4 people (0.4%), bachelors were 671 people (73.7%), and masters were 236 people (25.9%). The distribution of school level where respondents work consists of 94 elementary school teachers (10.3%), 150 junior high school teachers (16.5%), 383 senior high school teachers (42%), 261 vocational school teachers (28.6%), and other educational institutions as many as 23 people (2.5%). Distribution of respondents based on education and gender can be seen in table 1.

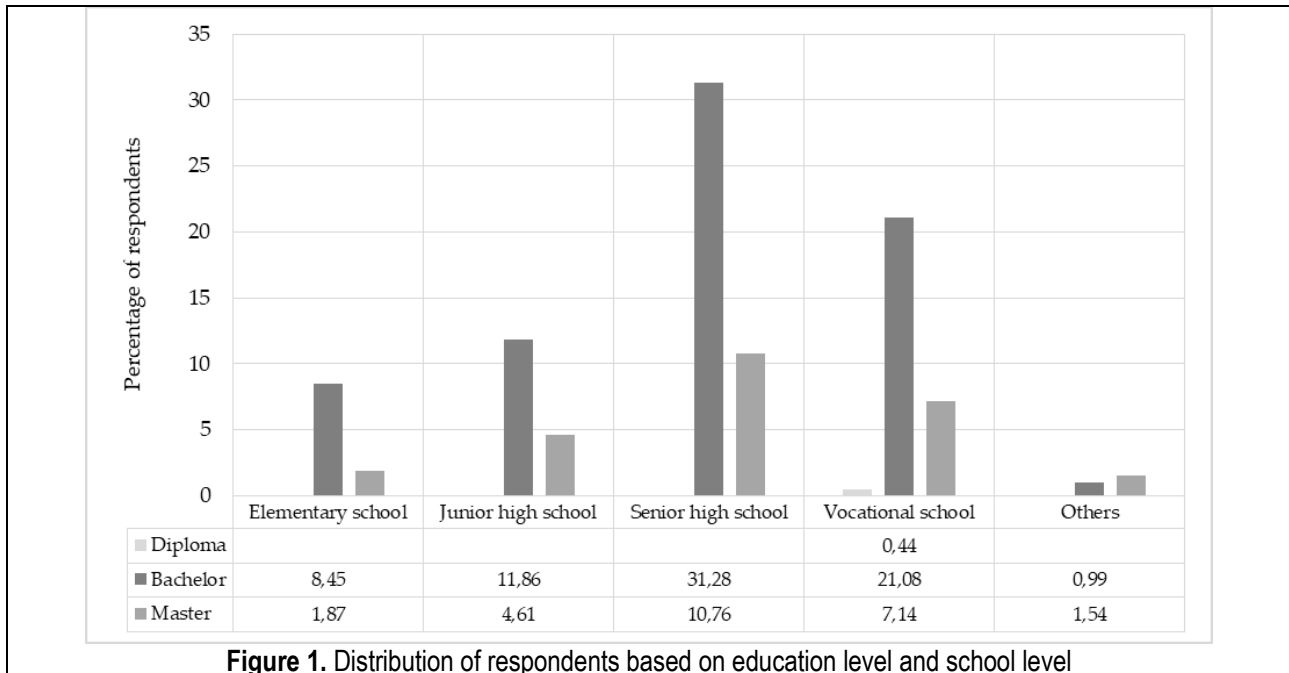
**Table 1.** Distribution of respondents based on education and gender

		Education			Total	
		Diploma	Bachelor	Master		
r	Male	Count	4	203	82	289
		%	0.4%	22.3%	9.0%	31.7%
e	Femal	Count	0	468	154	622
		%	0.0%	51.4%	16.9%	68.3%
Total		Count	4	671	236	911
		%	0.4%	73.7%	25.9%	100%

Table 1 described that the highest number of respondents were women with a degree of undergraduate education of 468 people (51.4%) while men amounted to 203 people (22.3%). Similarly, at the master's level of education, there were more women (154 people or 16.9%) than men 82 (9.0%). Conversely, at the diploma level of education, there were 4 men and women respondents not there. The majority of respondents were found to work as teachers in high schools (consisting of 299 women or 32.8% and 84 men or 9.2%) and vocational schools (147 women or 16.15 and 114 men or 12.5%). At the vocational school level, the number of female respondents was 147 people (16.1%) and 114 men (12.5%). At the junior high school level, there were 95 female respondents (10.4%) and 55 male (6.0%). At the elementary school level, 62 female respondents (6.8%) and 32 males (3.5%). While the smallest number of respondents was found in other educational institutions, 19 women (2.1%) and 4 men (0.4%). In terms of region, the province of West Sumatra is the largest respondent with 145 female participants (15.9%) and 17 male participants (1.9%). South Sulawesi had 91 female respondents (10%) and 63 males (6.9%). East Java has 78 female respondents (8.6%) and 52 males (5.7%). Respondents from Central Java were 72 women (7.9%) and 48 men (5.3%).

### 4.2 Education, school level, and region of the respondents

The education level of the most respondents was bachelor, 671 teachers (73.66%), with distribution in elementary schools 8.45% (77 people), junior high school 11.86% (108 people), senior high school 31.28% (285 people), vocational school 21.08% (192 people), and other educational institutions 0.99% (9 people). Respondents with master's degrees were 236 people (25.9%), who were found mostly in the high school level, 10.76% (98 people), then in vocational schools which was 7.14% (65 people). Meanwhile, teachers who have a diploma level of education (D2 / D3) were found in vocational school, by 0.44% (4 people). The distribution of respondents based on education level and school level of the study is presented in Figure 1.



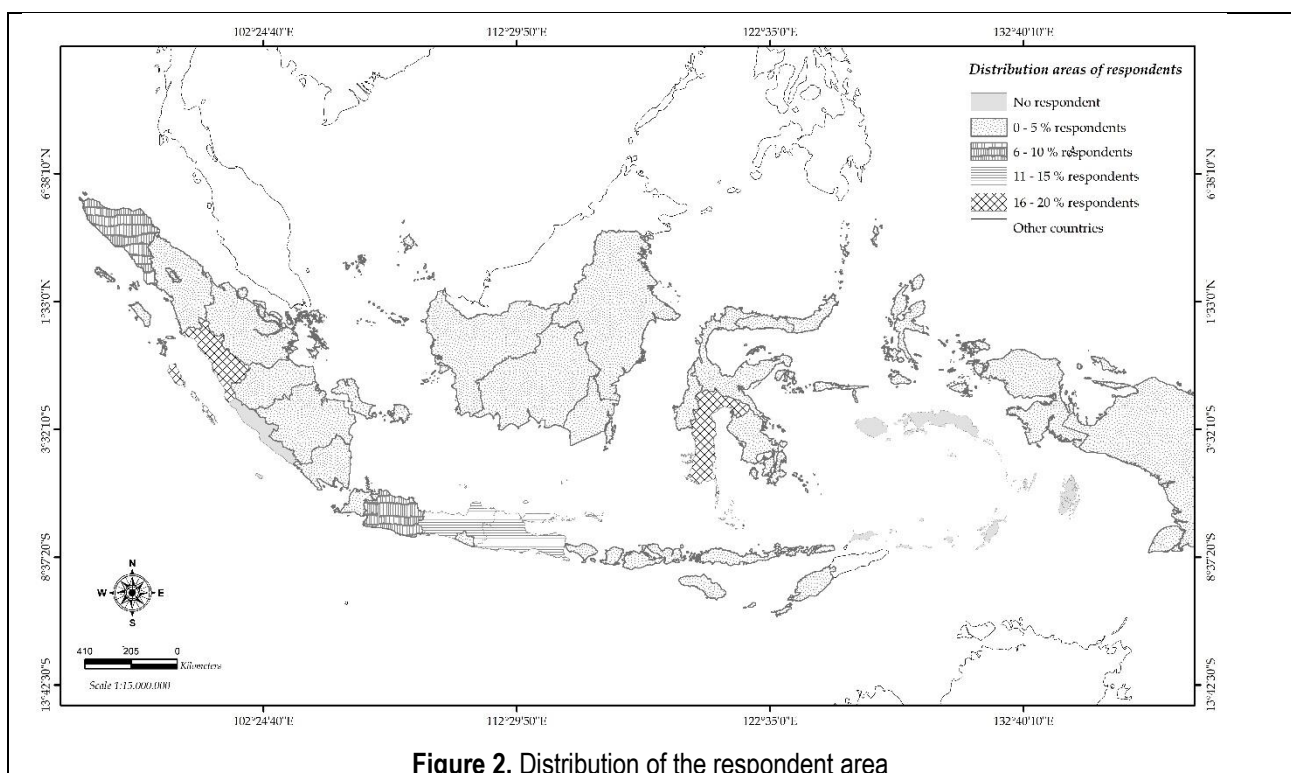
**Figure 1.** Distribution of respondents based on education level and school level

Respondents based on the working area were distributed in 32 provinces (see Table 2). The distribution of respondents varied by region. Most respondents are from West Sumatra, 17.78% (162 teachers), then South Sulawesi 16.90% (154 people), East Java 14.27% (130 persons), and Central Java 13.17% (120 participants). West Java and Nanggroe Aceh Darussalam included many respondents, namely 7.14% (65 people) and 5.60% (51 people), respectively. The five provinces having the fewest respondents with 1 person each (0.11%) were Gorontalo, Central Kalimantan, North Maluku, West Nusa Tenggara, and West Sulawesi. The distribution of the respondent area is summarized in Figure 2.

**Table 2.** Respondents based on the working area

No	Provinces name	Number of respondents	Percentage (%)
1	Bali	4	0,44
2	Banten	17	1,87
3	In Yogyakarta	16	1,76
4	DKI Jakarta	4	0,44
5	Gorontalo	1	0,11
6	Jambi	5	0,55
7	West Java	65	7,14
8	Central Java	120	13,17
9	East Java	130	14,27
10	West Kalimantan	4	0,44
11	South Kalimantan	8	0,88
12	Central Kalimantan	1	0,11
13	East Kalimantan	3	0,33
14	North Kalimantan	37	4,06
15	Bangka Belitung Islands	8	0,88
16	Riau islands	11	1,21
17	Lampung	30	3,29
18	North Maluku	1	0,11

19	Nanggroe Aceh Darussalam	51	5,60
20	West Nusa Tenggara	1	0,11
21	East Nusa Tenggara	2	0,22
22	Papua	3	0,33
23	West Papua	4	0,44
24	Riau	20	2,20
25	West Sulawesi	1	0,11
26	South Sulawesi	154	16,90
27	Central Sulawesi	5	0,55
28	Southeast Sulawesi	4	0,44
29	North Sulawesi	2	0,22
30	West Sumatra	162	17,78
31	South Sumatra	20	2,20
32	North Sumatra	17	1,87
Total		911	100



**Figure 2.** Distribution of the respondent area

The distribution of respondents based on education and the region where they work could be found that the number of respondents with the most 10 undergraduate education in a row came from the province of West Sumatra 116 people (12.7%), East Java 108 people (11.9%), South Sulawesi 106 people (11.6%), Central Java 91 people (10%), Nanggroe Aceh Darussalam 50 people (5.5%), North Kalimantan 35 people (3.8%), West Java 30 people (3.3%), Lampung 22 people (2.4%), North Sumatra 17 people (1.9%), and Riau 17 people (1.9%). Respondents with a master's degree were found in the province of South Sulawesi 48 people (5.3%), West Sumatra 46 people (5.0%), West Java 35 people (3.8%), Central Java 29 people (3.2%), East Java 21 people (2.3%), Lampung 8 people (0.9%), 7 people (0.8%), Daerah Istimewa Yogyakarta 6 people (0.7%), West Kalimantan 4 people (0.4%), Bangka Belitung Islands 4 people (0.4%), Riau Islands 4 people (0.4%), West Sumatra 4 people (0.4%), Jambi 3 people (0.3%), Riau 3 people (0.3%), DKI Jakarta 2 people (0.2%),

South Kalimantan 2 people (0.2%), North Kalimantan 2 people (0.2%), Papua 2 people (0.2%), West Papua 2 people (0.2%), North Sulawesi 2 people (0.2%), Nanggroe Aceh Darussalam 1 person (0.1%), and Southeast Sulawesi 1 person (0.1%).

### 4.3 The benefits of online training substance obtained by the teachers

Indonesian teachers need to add knowledge to support their profession as educators, one of whom is attending online training. Following online training (like online exam preparation questions) during the Covid-19 pandemic, teachers gained knowledge at various levels. There were 767 respondents (84.19%) said that online training was very useful to improve their competence. It consisted of senior high school teachers, 36.55% (333 people); vocational school teachers, 23.49% (214 people); junior high school, 13.83% (126 people); elementary school teachers, 8.12% (74 people); and other education institutions, 2.20% (20 people). Otherwise, there were 68 respondents (7.46%) explained that online training didn't provide a significant benefit in improving their competences. They were vocational school teachers, 2.74% (25 people); senior high school teachers, 2.31% (21 people); junior high school teachers, 1.21% (11 people); elementary school teachers, 1.10% (10 people); and other education institutions, 0.11% (1 person). The benefit level of online training in improving teacher knowledge is shown in Figure 3.

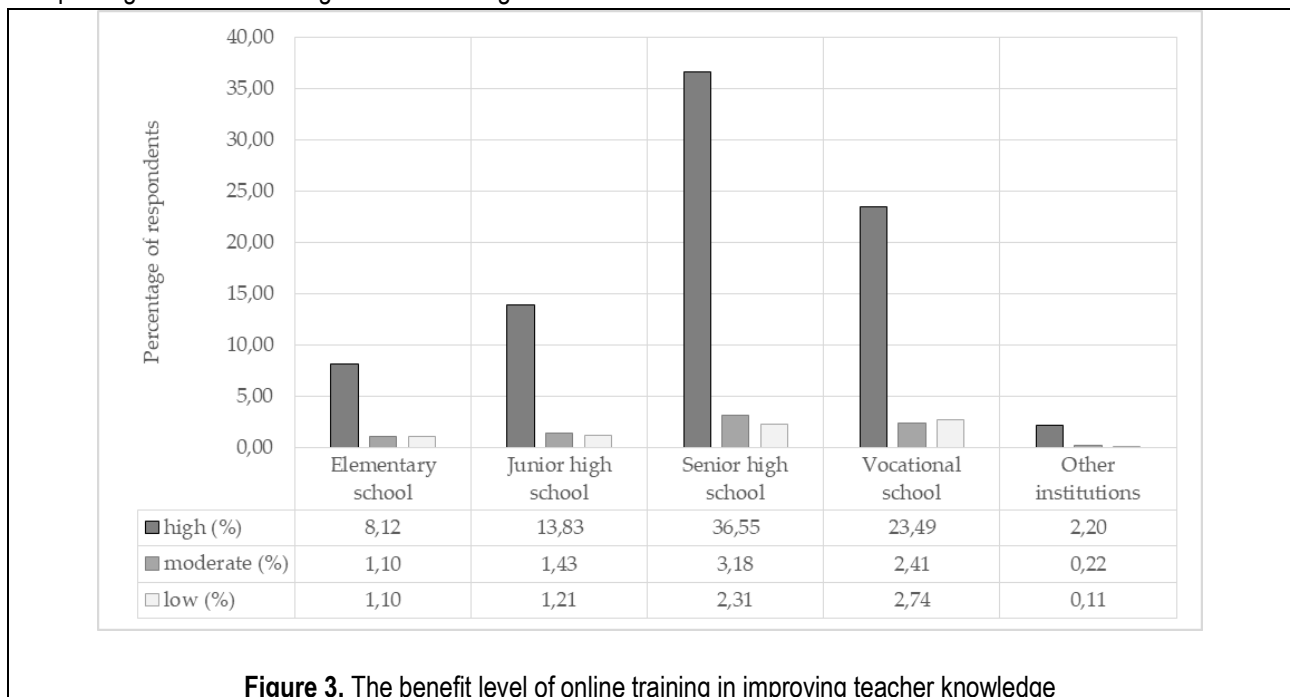


Figure 3. The benefit level of online training in improving teacher knowledge

### 4.4 Skill improvement in using online learning applications

The use of online learning media during the Covid-19 pandemic provided benefits for teachers in Indonesia. It was not only to increase their substance knowledge taught in online training, but teachers also gained skills improvement in using online learning applications. Of the 911 participants, 748 people (82.11%) stated that their online application skills were highly improved, 98 participants (10.8%) got moderate skill improvement, and 65 teachers (7.1%) obtained low skill improvement.

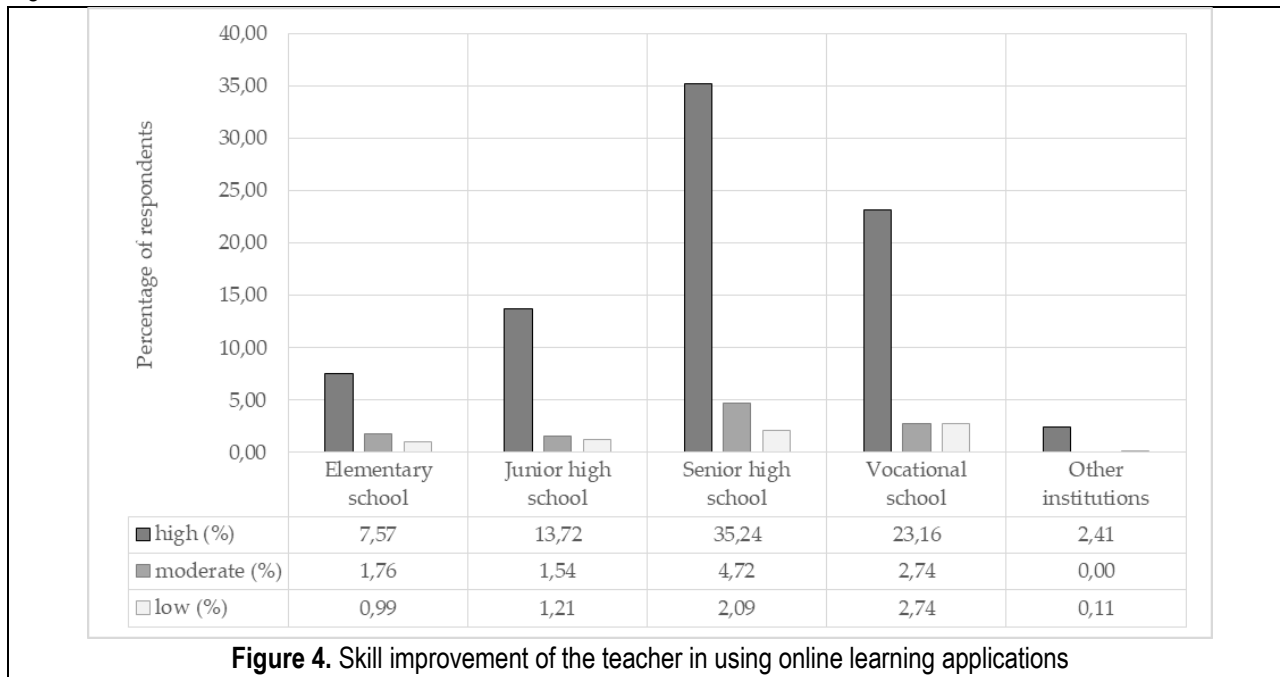
When viewed from the sex distribution, respondents who received high benefits in using online learning applications were 520 women (57.1%) and 228 men (25%). Women who received moderate skill improvement were 60 people (6.6%) and 38 men (4.2%). Whereas those who argue were not very useful (low skill improvement) were 42 women (4.6%) and 23 men (2.5%). Improving the skills of teachers in using online learning applications based on the distribution of respondents' educational levels is presented in table 3.

**Table 3.** Using online learning applications based on the distribution of respondents' educational levels

		Online learning application				
		Low skill improvement	Moderate skill improvement	High skill improvement	Total	
Education	Diploma	Count	0	0	4	4
		% of Total	0.0%	0.0%	0.4%	0.4%
	Bachelor	Count	45	70	556	671
		% of Total	4.9%	7.7%	61.0%	73.7%
	Master	Count	20	28	188	236
		% of Total	2.2%	3.1%	20.6%	25.9%
Total		Count	65	98	748	911
		% of Total	7.1%	10.8%	82.1%	100.0%

Respondents who received the highest number of improvised high skills using online learning applications in this study were at the bachelor's level of education as many as 556 people (61%) then the master level as many as 188 people (20.6%). Whereas respondents with an income did not absorb the benefits of increasing their skills, namely at the bachelor's level of education as many as 45 people (4.9%) and masters as many as 20 people (2.2%).

Respondents felt a significant increase in skills using online learning applications. The responses consisted of senior high school teachers at 35.24% (321 people); vocational school teachers 23.16% (211 people); junior high school teachers 13.72% (125 people); elementary school teachers 7.57% (69 people); and other educational institutions 2.41% (22 people). 98 teachers have experienced a moderate improvement in online application skills. They included senior high school teachers, 4.72% (43 people); vocational school teachers, 2.74% (25 people); elementary school teachers, 1.76% (16 people) and junior high school teachers, 1.54% (14 people). 65 teachers have experienced a low improvement in online application skills. They were vocational school teachers, 2.74% (25 people); senior high school teachers, 2.09% (19 people); junior high school teachers, 1.21% (11 people); elementary school teachers, 0.99% (9 persons); and other institutions, 0.11% (1 person). The skill improvement of the teacher in using online learning applications is presented in Figure 4.



**Figure 4.** Skill improvement of the teacher in using online learning applications

**4.5 Relationship among variables**

The results of the investigation of the relationship between variables through the Spearman correlation coefficient, both between the characteristics of the sample and the benefits of online training substance to increase online learning



application skills found that gender, education, school level, and region of the benefits of online training substance had no association, seen by the significance value (two-tailed) > 0.05. Likewise, gender, education, school level, and region to increase skills in using online learning applications had no relationship, seen with a significance value (two-tailed) > 0.05. Skill improvement of the Indonesian teachers in using online learning application was more influenced by the type of substance of online training. It was evidenced by the results of the correlation test between the substance of online training with increased skills, where the two variables had a very close relationship, a significance value (two-tailed) < 0.05, and a very high degree of relationship of 0.90. The relationship between the sample character variables, the substance of online training with increasing skills in using online learning applications is shown in table 4.

**Table 4.** The relationship between the sample character variables, the substance of online training with increasing skills in using online learning applications

Sample characteristics	Relationship	The substance of online training	Skill improvement in using the online application
Gender	Correlation coefficient	0.05	0.05
	Sig. (two-tailed)	0.11	0.09
Education	Correlation coefficient	-0.05	-0.04
	Sig. (two-tailed)	0.10	0.21
School-level	Correlation coefficient	0.01	0.31
	Sig. (two-tailed)	0.88	0.35
Region	Correlation coefficient	0.01	-0.03
	Sig. (two-tailed)	0.88	0.41
The substance of online training	Correlation coefficient	1.00	0.90**
	Sig. (two-tailed)	.	0.00

\*\* Correlation is significant at the 0.01 level (2-tailed)

## 5. Discussion

The Covid-19 pandemic hurts various sectors in Indonesia including social and educational sectors. For example, all educational facilities are closed, from kindergartens, elementary schools, junior high schools, senior high schools, and vocational schools, to universities. The face-to-face learning process turns into online learning. However, the existence of this pandemic has a positive impact on teachers. The number and frequent use of online learning media affect the improvement of the skills of teachers in utilizing online learning applications. Institutions under the ministry of education and culture that handle training providers for teachers also open online teacher competency enhancement training. This makes teachers more accustomed to using online learning applications. This reality can be proven by the 911 respondents who were asked to express their experiences, there were 748 teachers (82.11%) distributed in 32 provinces in Indonesia explained during the Covid-19 pandemic, skills in using learning applications increased sharply. This condition was not significantly affected by the characteristics of respondents, such as gender, education level, school level, and region. However, variables that greatly influence the improvement of skills in using online learning applications are the themes or substance of the online training that they follow. Spearman correlation test results of these two variables show a significance value (two-tailed) < 0.05 and a very strong degree of relationship of 0.90. It was because the online training that the teachers took was aimed at facilitating teachers/educators in making online exam questions for students and introducing applications that could be used for making online exam questions and assessments. Online learning applications commonly used by teachers include Google Classroom, Edmodo, Moodle, learning house (rumah belajar), Webex, zoom, and wondershare.

Online-based learning has several advantages for teachers. It encourages teachers to participate in interactive learning (Hamilton et al., 2001; Mumford & Dikilitaş, 2020), which can be done anywhere and anytime (Zhang & Liu, 2019); it becomes information technology literacy for teachers to improve their learning management skills independently and open opportunities for good collaboration with teachers in other areas or experts in a field of science (Glava & Glava, 2011;

Krutka et al., 2014; Prenger et al., 2017); it is more practical and flexible because it does not require formal classrooms; the approach used is a blended learning implementation (Han et al., 2019); delivery of material can be done online tools such as photos and videos (Anderson & Justice, 2015; Bayram, 2012); the learning process can be documented or recorded, so learning material can be stored in digital form; it is less paper or other stationery

However, in online learning in Indonesia, there are still some challenges. Indonesia is an archipelago that consists of many small isolated islands and a lack of facilities and infrastructure. Of course, internet services are limited to small islands far from the mainland, making it difficult for teachers to do online learning. As with schools in rural areas far from cities (Li et al., 2020), internet networks are generally inadequate, making it difficult to access the internet in online learning. Also, older teachers generally have limitations in operating computers, so they cannot participate actively in online learning.

## 6. Conclusion

The Covid-19 pandemic in Indonesia harms the education sector and social life of the community including teachers. The process of teaching and learning face to face informal schools was abolished temporarily because of the rules of maintaining social and physical distance to prevent the Covid-19 spread. Finally, online learning and online-based training among teachers are growing rapidly. This situation gives positive encouragement for teachers to add skills in using online learning applications.

The mastery of online applications by Indonesian teachers during the Covid-19 pandemic period increased significantly. The evidence was shown by 911 teachers being asked questions using the Google form questionnaire, there were 748 (82.11%) teachers stating that more learning applications were mastered during the pandemic compared to before Covid-19 infection. They consisted of senior high school teachers at 35.24% (321 people); vocational school teachers 23.16% (211 people); junior high school teachers 13.72% (125 people); elementary school teachers 7.57% (69 people); and other educational institutions 2.41% (22 people). Nowadays, they are more familiar with using online applications such as Google classroom, Edmodo, Moodle, learning house, Webex, zoom, and wondershare.

This study found that the most determining factor for improving the skills of teachers in using online learning applications was not influenced by gender, education level, school level, and the province where they work. But it was largely determined by the theme and substance of the online training that was followed. The proof was that the correlation between the two variables was very strong, the significance value  $<0.05$ , and the degree of relationship 0.90. This study didn't investigate how effective online learning between teachers and students was during the Covid-19 pandemic. Moreover, in schools on the small and outer islands of Indonesia, which lacks internet facilities. Therefore, further research needs to examine this to know the impact of Covid-19 on social and education in Indonesia properly.

## References

- Abdellatif, W., Ding, J., Jalal, S., Nguyen, T., Khorshed, D., Rybicki, F. J., Ali, I. T., McInnes, M. D. F., Khan, N. A., Shah, S., & Khosa, F. (2020). Lack of Gender Disparity Among Administrative Leaders of Canadian Health Authorities. *Journal of Women's Health, 00(00)*, 1–6. <https://doi.org/10.1089/jwh.2019.7852>
- Abidah, A., Hidaayatullaah, H. N., Simamora, R. M., Fehabutar, D., & Mutakinati, L. (2020). The Impact of Covid-19 to Indonesian Education and Its Relation to the Philosophy of "Merdeka Belajar." *Studies in Philosophy of Science and Education, 1(1)*, 38–49. <https://doi.org/10.46627/sipose.v1i1.9>
- Ahmed, S., Shehata, M., & Hassanien, M. (2020). Emerging Faculty Needs for Enhancing Student Engagement on a Virtual Platform. *MedEdPublish, 9(1)*, 1–5. <https://doi.org/10.15694/mep.2020.000075.1>
- Al-Awadhi, A. M., Alsaifi, K., Al-Awadhi, A., & Alhammadi, S. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. *Journal of Behavioral and Experimental Finance. https://doi.org/10.1016/j.jbef.2020.100326*
- Ali, I., & Alharbi, O. M. L. (2020). COVID-19: Disease, management, treatment, and social impact. *Science of the Total Environment, 728*, 138861. <https://doi.org/10.1016/j.scitotenv.2020.138861>
- Anderson, J. L., & Justice, J. E. (2015). Disruptive design in pre-service teacher education: uptake, participation, and resistance. *Teaching Education, 26(4)*, 400–421. <https://doi.org/10.1080/10476210.2015.1034679>

- Andreasen, J. K., Bjørndal, C. R. P., & Kovač, V. B. (2019). Being a teacher and teacher educator: The antecedents of teacher educator identity among mentor teachers. *Teaching and Teacher Education*, 85, 281–291. <https://doi.org/10.1016/j.tate.2019.05.011>
- Banggur, M. D. V., Situmorang, R., & Rusmono. (2018). Pengembangan Pembelajaran Berbasis Blended Learning pada Mata Pelajaran Etimologi Multimedia. *JTP - Jurnal Teknologi Pendidikan*, 20(2), 152–165. <https://doi.org/10.21009/JTP2002.5>
- Bardach, L., & Klassen, R. M. (2020). Smart teachers, successful students? A systematic review of the literature on teachers' cognitive abilities and teacher effectiveness. *Educational Research Review*, 30(November 2019), 100312. <https://doi.org/10.1016/j.edurev.2020.100312>
- Basilaia, G., & Kvavadze, D. (2020). Transition to Online Education in Schools during a SARS-CoV-2 Coronavirus (COVID-19) Pandemic in Georgia. *Pedagogical Research*, 5(4). <https://doi.org/10.29333/pr/7937>
- Bayram, L. (2012). Use of Online Video Cases in Teacher Training. *Procedia - Social and Behavioral Sciences*, 47, 1007–1011. <https://doi.org/10.1016/j.sbspro.2012.06.770>
- Bostwick, K. C. P., Collie, R. J., Martin, A. J., & Durksen, T. L. (2020). Teacher, classroom, and student growth orientation in mathematics: A multilevel examination of growth goals, growth mindset, engagement, and achievement. *Teaching and Teacher Education*, 94. <https://doi.org/10.1016/j.tate.2020.103100>
- Bruinen de Bruin, Y., Lequarre, A. S., McCourt, J., Clevestig, P., Pigazzani, F., Zare Jeddi, M., Colosio, C., & Goulart, M. (2020). Initial impacts of global risk mitigation measures taken during the combatting of the COVID-19 pandemic. *Safety Science*. <https://doi.org/10.1016/j.ssci.2020.104773>
- Camacho, D. A., & Parham, B. (2019). Urban teacher challenges: What they are and what we can learn from them. *Teaching and Teacher Education*, 85, 160–174. <https://doi.org/10.1016/j.tate.2019.06.014>
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*. <https://doi.org/10.1016/j.psychres.2020.112934>
- Chakraborty, I., & Maity, P. (2020). COVID-19 outbreak: Migration, effects on society, global environment and prevention. *Science of the Total Environment*. <https://doi.org/10.1016/j.scitotenv.2020.138882>
- Corbin, C. M., Alamos, P., Lowenstein, A. E., Downer, J. T., & Brown, J. L. (2019). The role of teacher-student relationships in predicting teachers' personal accomplishment and emotional exhaustion. *Journal of School Psychology*, 77(November), 1–12. <https://doi.org/10.1016/j.jsp.2019.10.001>
- de Jong, L., Meirink, J., & Admiraal, W. (2019). School-based teacher collaboration: Different learning opportunities across various contexts. *Teaching and Teacher Education*, 86. <https://doi.org/10.1016/j.tate.2019.102925>
- Dietrich, J., Dicke, A. L., Kracke, B., & Noack, P. (2015). Teacher support and its influence on students' intrinsic value and effort: Dimensional comparison effects across subjects. *Learning and Instruction*, 39, 45–54. <https://doi.org/10.1016/j.learninstruc.2015.05.007>
- Djalante, R., Lassa, J., Setiamarga, D., Sudjatma, A., Indrawan, M., Haryanto, B., Mahfud, C., Sinapoy, M. S., Djalante, S., Rafliana, I., Gunawan, L. A., Surtiari, G. A. K., & Warsilah, H. (2020). Review and analysis of current responses to COVID-19 in Indonesia: Period of January to March 2020. *Progress in Disaster Science*. <https://doi.org/10.1016/j.pdisas.2020.100091>
- Firman, Rahayu, S., Aji, W., Dewi, F., Kristen, U., Wacana, S., Abidin, Z., Arizona, K., Barat, N. T., Studi, P. P. C., Fisika, T., Arthamin, M. Z., Batubara, Hamdan, H., Ariani, D. N., Tengah, D., Pandemi, W., Learning, S. D., Pujilestari, Y., Abidin, Z., ... Anhusadar, L. O. (2020). Platform Whatsapp Group Dan Webinar Zoom Dalam Pembelajaran Jarak Jauh Pada Masa Pandemi Covid 19. *Jurnal Ilmiah Pendidikan Matematika Volume*, 5(1), 81–89. <https://doi.org/http://dx.doi.org/10.24014/kjiece.v3i1.9609>
- Gentrup, S., Lorenz, G., Kristen, C., & Kogan, I. (2020). Self-fulfilling prophecies in the classroom: Teacher expectations, teacher feedback and student achievement. *Learning and Instruction*, 66(November 2019). <https://doi.org/10.1016/j.learninstruc.2019.101296>
- Glava, C. C., & Glava, A. E. (2011). On-line learning platforms as virtual classrooms. Case study of initial primary teachers training at Babes-Bolyai University of Cluj-Napoca, Romania. *Procedia Computer Science*, 3, 672–676.

<https://doi.org/10.1016/j.procs.2010.12.112>

- Goldschmidt, K. (2020). The COVID-19 pandemic: Technology use to support the wellbeing of children. *Journal of Pediatric Nursing*. <https://doi.org/10.1016/j.pedn.2020.04.013>
- Gunawan, S. N. M. ., & Fathoroni. (2020). Variations of Models and Learning Platforms for Prospective Teachers During the COVID-19 Pandemic Period. *Teacher Education*, 1(2), 61–70. <https://scholar.google.co.id/citations?user=rBoKST7EAAAAAJ&hl=id&oi=sra>
- Hagerty, S. L., & Williams, L. M. (2020). the Impact of Covid-19 on Mental Health: the Interactive Roles of Brain Biotypes and Human Connection. *Brain, Behavior, & Immunity Health*, 5(April), 100078. <https://doi.org/10.1016/j.bbih.2020.100078>
- Hamilton, J., Reddel, S., & Spratt, M. (2001). Teachers' perceptions of on-line rater training and monitoring. *System*, 29(4), 505–520. [https://doi.org/10.1016/S0346-251X\(01\)00036-7](https://doi.org/10.1016/S0346-251X(01)00036-7)
- Han, X., Wang, Y., & Jiang, L. (2019). Towards a framework for an institution-wide quantitative assessment of teachers' online participation in blended learning implementation. *Internet and Higher Education*, 42(November 2018), 1–12. <https://doi.org/10.1016/j.iheduc.2019.03.003>
- Jennings, P. A., Doyle, S., Oh, Y., Rasheed, D., Frank, J. L., & Brown, J. L. (2019). Long-term impacts of the CARE program on teachers' self-reported social and emotional competence and well-being. *Journal of School Psychology*, 76(October 2018), 186–202. <https://doi.org/10.1016/j.jsp.2019.07.009>
- Kerimray, A., Baimatova, N., Ibragimova, O. P., Bukenov, B., Kenessov, B., Plotitsyn, P., & Karaca, F. (2020). Assessing air quality changes in large cities during COVID-19 lockdowns: The impacts of traffic-free urban conditions in Almaty, Kazakhstan. *Science of the Total Environment*, 730, 139179. <https://doi.org/10.1016/j.scitotenv.2020.139179>
- Krutka, D. G., Bergman, D. J., Flores, R., Mason, K., & Jack, A. R. (2014). Microblogging about teaching: Nurturing participatory cultures through collaborative online reflection with pre-service teachers. *Teaching and Teacher Education*, 40, 83–93. <https://doi.org/10.1016/j.tate.2014.02.002>
- Kupers, E., & van Dijk, M. (2020). Creativity in interaction: the dynamics of teacher-student interactions during a musical composition task. *Thinking Skills and Creativity*, 36(November 2019). <https://doi.org/10.1016/j.tsc.2020.100648>
- Kusuma, J. W., & Hamidah, H. (2020). PERBANDINGAN HASIL BELAJAR MATEMATIKA DENGAN PENGGUNAAN PLATFORM WHATSAPP GROUP DAN WEBINAR ZOOM DALAM PEMBELAJARAN JARAK JAUH PADA MASA PANDEMIK COVID 19. *JIPMat*. <https://doi.org/10.26877/jipmat.v5i1.5942>
- Li, J., Shi, Z., & Xue, E. (2020). The problems, needs and strategies of rural teacher development at deep poverty areas in China: Rural schooling stakeholder perspectives. *International Journal of Educational Research*, 99(March 2019), 1–10. <https://doi.org/10.1016/j.ijer.2019.101496>
- Liu, L. (2020). Emerging study on the transmission of the Novel Coronavirus ( COVID-19 ) from urban perspective : Evidence from China. *Cities*, 103(March), 102759. <https://doi.org/10.1016/j.cities.2020.102759>
- McFadden, A., & Williams, K. E. (2020). Teachers as evaluators: Results from a systematic literature review. *Studies in Educational Evaluation*, 64(November 2019). <https://doi.org/10.1016/j.stueduc.2019.100830>
- Mohler, G., Bertozzi, A. L., Carter, J., Short, M. B., Sledge, D., Tita, G. E., Uchida, C. D., & Brantingham, P. J. (2020). *Impact of social distancing during COVID-19 pandemic on crime in Indianapolis*. 68(April).
- Mumford, S., & Dikilitaş, K. (2020). Pre-service language teachers reflection development through online interaction in a hybrid learning course. *Computers and Education*. <https://doi.org/10.1016/j.compedu.2019.103706>
- Nakada, L. Y. K., & Urban, R. C. (2020). COVID-19 pandemic: Impacts on the air quality during the partial lockdown in São Paulo state, Brazil. *Science of The Total Environment*. <https://doi.org/https://doi.org/10.1016/j.scitotenv.2020.139087>
- Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., Agha, M., & Agha, R. (2020). The Socio-Economic Implications of the Coronavirus and COVID-19 Pandemic: A Review. *International Journal of Surgery*, 78(March), 185–193. <https://doi.org/10.1016/j.ijssu.2020.04.018>
- Niu, S., Tian, S., Lou, J., Kang, X., Zhang, L., Lian, H., & Zhang, J. (2020). Clinical characteristics of older patients infected with COVID-19: A descriptive study. *Archives of Gerontology and Geriatrics*, 89(March), 104058.

<https://doi.org/10.1016/j.archger.2020.104058>

- Osman, D. J., & Warner, J. R. (2020). Measuring teacher motivation: The missing link between professional development and practice. *Teaching and Teacher Education*, 92. <https://doi.org/10.1016/j.tate.2020.103064>
- Prenger, R., Poortman, C. L., & Handelzalts, A. (2017). Factors influencing teachers' professional development in networked professional learning communities. *Teaching and Teacher Education*, 68, 77–90. <https://doi.org/10.1016/j.tate.2017.08.014>
- Saadat, S., Rawtani, D., & Hussain, C. M. (2020). Environmental perspective of COVID-19. In *Science of the Total Environment*. <https://doi.org/10.1016/j.scitotenv.2020.138870>
- Sahu, P. (2020). Closure of Universities Due to Coronavirus Disease 2019 (COVID-19): Impact on Education and Mental Health of Students and Academic Staff. *Cureus*, 2019(April). <https://doi.org/10.7759/cureus.7541>
- Sintema, E. J. (2020). Effect of COVID-19 on the Performance of Grade 12 Students: Implications for STEM Education. *Eurasia Journal of Mathematics, Science and Technology Education*, 16(7). <https://doi.org/10.29333/ejmste/7893>
- Verawardina, U., Asnur, L., Lubis, A. L., Hendriyani, Y., Ramadhani, D., Dewi, I. P., Darni, R., Betri, T. J., Susanti, W., & Sriwahyuni, T. (2020). Reviewing online learning facing the Covid-19 outbreak. *Talent Development and Excellence*, 12(SpecialIssue3), 385–392.
- Yang, J., Zheng, Y., Gou, X., Pu, K., Chen, Z., Guo, Q., Ji, R., Wang, H., Wang, Y., & Zhou, Y. (2020). Prevalence of comorbidities and its effects in coronavirus disease 2019 patients: A systematic review and meta-analysis. *International Journal of Infectious Diseases*, 94, 91–95. <https://doi.org/10.1016/j.ijid.2020.03.017>
- Zavelevsky, E., & Lishchinsky, O. S. (2020). An ecological perspective of teacher retention: An emergent model. *Teaching and Teacher Education*, 88. <https://doi.org/10.1016/j.tate.2019.102965>
- Zhang, S., & Liu, Q. (2019). Investigating the relationships among teachers' motivational beliefs, motivational regulation, and their learning engagement in online professional learning communities. *Computers and Education*, 134(February), 145–155. <https://doi.org/10.1016/j.compedu.2019.02.013>
- Zhu, X., & Liu, J. (2020). Education in and After Covid-19: Immediate Responses and Long-Term Visions. *Postdigital Science and Education*. <https://doi.org/10.1007/s42438-020-00126-3>