Teachers' Perception of Teaching and Learning During to Post Covid-19 Pandemic Era: A Case of Indonesian Mathematics Teachers

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This study explores secondary school mathematics teachers' perceptions of teaching and learning during to post the COVID-19 Pandemic. The Quantitative data were collected through a survey of 45 secondary school mathematics teachers (34 females and 11 males). Moreover, the qualitative data were collected through semi-structured interviews with four secondary school mathematics teachers (2 females and two males). The quantitative data were analysed statistically. Moreover, thematic analysis was used to analyse the qualitative data. The quantitative results indicate a significant connection between teachers' difficulties in teaching and learning and their profiles: their school type, academic degree, and professional qualification. The secondary mathematics teachers of public schools faced more obstacles than the teachers of private schools. The qualitative analysis showed that five main instructional aspects might affect teaching and learning success during the pandemic era: learning modes, learning activities, learning media, learning tools, assessment, and time consumption.

Keywords: perception, online teaching and learning, obstacles

INTRODUCTION

The outbreak of the COVID-19 pandemic around the world has changed almost all aspects of life, including education. The obstacles of overcoming the epidemic so that it does not spread more widely have forced world leaders to develop super strict rules so that the chain of transmission of COVID-19 can be broken. WHO (World Health Organization) (2019) offers some recommendations, such as social and physical distancing, which have made choices challenging to implement in each country. In March 2022, the Indonesian government implemented "large-scale social restrictions" due to the increasing number of infected people. Then, it was followed by other regulations such as learning from home for all students at

any level of education (Kementerian Sekretariat Negara Republik Indonesia, 2020). This regulation, then, was followed by another regulation made by the Ministry of Education and Culture regarding the mode of teaching and learning and adaption to the curriculum (Ministry of Education and Culture, 2020).

At the beginning of the pandemic era, all schools were forced to stop and adapt to the "new normal" learning mode without classroom activities. Theoretically, there are some options for learning mode, such as fully online (i.e., interned-based: synchronous and asynchronous) or mix-learning mode (Online and Offline) (Richardson et al., 2020). The teacher or school can choose the various learning mode options. However, each option has its advantages and disadvantages. Recent studies show that many factors influence the success of online learning, including financial ability, internet access, people's background, teacher and school quality, depression, and anxiety (Cairney-Hill et al., 2021; Davis et al., 2022; Ford et al., 2021; Gurung, 2021; Kamal & Illiyan, 2021; Özüdoğru, 2021; Wallace et al., 2022; Yan et al., 2022).

At present, the situation is showing the direction of "the ending" of the pandemic period towards the post-pandemic period, which means that at this point, the world of education will get back to normal in its functions. This is indicated by the regulation of the ministry of education and culture regarding the new rules for implementing learning that learning will slowly be carried out face-to-face in the classroom (Ministry of Education and Culture, 2022). However, this also needs to be separated from the process of re-adaptation related to the learning process. It can be assumed that several factors will influence this adaptation process. Therefore, researchers are interested in conducting a thorough investigation regarding teacher perceptions of teaching and learning during the pandemic towards the post-pandemic era.

METHOD

Research Design

The method of this current research was a mixed method: quantitative and qualitative (a case study). The quantitative analysis aimed to investigate the correlation/connection between teachers' profiles (i.e., gender, type of school, professional qualification, and education degree) and their difficulties in teaching during the pandemic era. Meanwhile, the purpose of the case study is to describe a case of teachers' difficulties in teaching faced during the pandemic toward the post-pandemic era in-depth in real-life comprehensively (Creswell, 2012). All research instruments, including the operational definition and indicators, were developed based on our literature review and validated by experts.

Participants

Participants in this study were 45 mathematics teachers at secondary schools in Malang and Batu cities, east java, Indonesia. The participants were chosen using a purposive sampling technique based on their demographic factors such as gender, types of schools, professional qualifications, and willingness to be involved in the research. Then, they were invited to answer online questionnaires via Google Forms. TABLE 1 presents the profiles of the participants. Then, we invited four teachers involved in the survey to the interview session. The four teachers were chosen based on their willingness to involve in the research, gender and types of school representation (2 private and 2 public schools, 2 males and 2 females) and their communication skills.

TABLE 1
PROFILE OF PARTICIPANTS

	Frequency	Percentages (%)
Gender		
Female	11	24.4
Male	34	75.6
Type of School		
Public School	31	68.9
Private School	14	31.1

Degree of Education		
Master	9	20
Bachelor	36	80
Professional Qualification		
Certified	35	66.7
Not Certified	10	33.3

Data Collection

There were two stages of data collection. The first stage was collecting data surveys of mathematics teachers in secondary schools in two cities in Indonesia who used online learning during the pandemic as participants. The survey was in the form of closed questions and applied the Likert scale using Google Forms. The questions represented the teachers' perception of teaching and learning during the pandemic covid-19. The second stage was an interview session using semi-structured open-ended questions involving 4 mathematics teachers who responded to the survey. The interviews were conducted online for 30 minutes to an hour per participant and were recorded via the GMeet app. Each teacher was assured of confidentiality and assigned a pseudonym.

Data Analysis

The quantitative data collected via the survey were analysed statistically using SPSS Statistic 26. We used a non-parametric test (e.g., Mann-Whitney U test) to analyse the survey data because the data were not distributed normally (Aljandali, 2017; Anwar et al., 2021). The Qualitative Data collected via the interview were analysed qualitatively to identify, evaluate, and make a theme expressed by participants using inductive and thematic analytics (Nowell et al., 2017; Saldaña, 2013). To do so, firstly, we transcribed the responses of each participant during the interview session. We read the transcript line-by-line, then coded and categorised the data survey and transcripts using NVivo 12 program. In this case, we used inductive coding to identify the themes based on the participant's responses to answer the research questions (Saldaña, 2013). Then, we interpreted the participants' responses based on the data (survey and transcripts) categorised and themed (i.e., triangulation data sources). During the research team meeting (i.e., triangulation of interpreters), we discussed the interpretation to cross-check whether all interpretations were based on the data. We conducted all these steps of analysis as a way to guarantee the credibility and confirmability of our findings (Korstjens & Moser, 2018; Nowell et al., 2017).

FINDINGS AND DISCUSSION

We used the Mann-Whitney U test to investigate the connection between teachers' obstacles in teaching and learning during the pandemic era and their gender, level of education, and type of school where they teach because the data were distributed normally; see TABLE 2. The Mann-Whitney U test result indicated that the mean scores of a variable regrading teaching difficulties for the teacher of public schools and private schools differed significantly,$U(31{,}14) = 126.500$, and two-tailed $p = 0.13$. In contrast, the mean scores for other aspects of each group did not differ significantly; see TABLE 2 for the details. It means that there was a significant connection between teachers' difficulties in online teaching and the type of schools. Teachers at public secondary schools face more obstacles during online learning than in private secondary schools. Our qualitative data indicated that there are several factors why teachers of public schools face more difficulties. First, most public school students were from low-income families with economic issues in preparing appropriate technological tools and skills to support online learning. Second, the students lived in rural areas where internet access was limited. These findings were also found in previous studies (Cairney-Hill et al., 2021; Ford et al., 2021; Giatman et al., 2020; Gurung, 2021; Gustiani & Sriwijaya, 2020; Kamal & Illiyan, 2021; Mishra et al., 2020; Özüdoğru, 2021).

TABLE 2
PROFILES OF TEACHER VS TYPES OF TEACHER'S OBSTACLES

Aspects	Groups	Mean Scores				Mann-Whitney U				Asymp. Sig. (2-tailed)			
		X_1	X_2	X_3	X_4	X_1	X_2	X_3	X_4	X_1	X_2	X_3	X_4
Type of School	Public	25.92*	23.58	21.61	22.16	126.500	199.00	174.00	191.00	.013*	.599	.191	.379
	Private	16.54	21.71	26.07	24.86								
Gender	Female	23.29	22.82	21.77	21.91	177.000	185.00	173.50	175.00	.768	.950	.659	.662
	Male	22.09	23.06	23.40	23.35								
Level of Education	Bachelor	23.40	24.57*	23.64	23.65	147.500	105.50	139.00	138.50	.646	.040*	.420	.357
	Master	21.39	16.72	20.44	20.39								
Professional Qualification	Certified	22.66	22.16	21.84	22.44	163.000	145.50	134.50	155.50	.715	.337	.045*	.462
	Not Certified	24.20	25.95	27.05*	24.95								

Note: X_1*:* difficulties in teaching; X_2*:* difficulties in assessment; X_1*:* difficulties in using appropriate learning material; X_1*:* difficulties in migration from online to offline;

The Mann-Whitney U test result indicated that the mean scores of variables regarding the difficulties in assessing the teacher whose level of education was a bachelor and master differed significantly,$U(36,9) = 105.50$, and two-tailed $p = 0.040$, see TABLE 2 for the details. It means there was a significant connection between teachers' difficulties in implementing assessments and teachers' level of education. Teachers with bachelor's degrees found it more difficult to assess their students' performance during online learning than master's degrees. There were several explanations to support these findings. For instance, the teachers whose academic degree was master's had broader knowledge of various assessment instruments that could be implemented while implementing learning from home. Consequently, they could implement flexible/appropriate assessment fitting to their situation. Existing studies confirmed these explanations by (Azhari & Fajri, 2022; Bawa'aneh, 2021; Guangul et al., 2020; Perwitasari et al., 2021; Slack & Priestley, 2022)

We also found a significant difference between the mean scores of variables related to teachers' difficulties in using appropriate learning materials to support their teaching between certified and non-certified teachers. The Mann-Whitney U test shows it,$U(35,10) = 134.50$, and two-tailed $p = 0.045$. It indicates that the non-certified teachers faced more obstacles in using or preparing appropriate learning materials during the pandemic than the accredited teachers. In other words, the certified teachers were more capable of using or preparing suitable learning material to support their learning than non-certified teachers. These findings were in line with previous studies by (Limbong et al., 2022; Sinulingga & Simatupang, 2019).

Based on our qualitative analysis, we identified six elements of online teaching and learning contributing achievement of instructional objectives, namely learning modes, learning activities, learning media, learning tools, assessment, and time consumption, see FIGURE 1.

Our data showed three learning modes: fully online, mixed online-offline, and hybrid learning used by the teachers, see FIGURE 2. Most teachers used mixed online-offline modes at the beginning of the pandemic era. The term online refers to a "modified" asynchronous learning where the subject matters (e.g., video of explanation, students' task, or assessment) were displayed and sent via WhatsApp application of the parents' mobile phone. The term "offline" of the mixed online-offline learning modes refers to face-to-face teaching and learning with some restrictions regarding the number of students and duration. They used this mixed learning mode because of (1) the limitation of technical aspects, such as the readiness of e-learning means, and (2) teachers' and students' capabilities to use e-learning platforms (GMeet, Google classroom, Zoom, etc.). However, then, some teachers attempted to implement fully online: synchronous or asynchronous. The teachers who teach at schools in rural areas where internet access and appropriate online learning platform are limited still use mixed online-offline. After the Indonesian government announced a regulation regarding relaxing the "large-scale social restrictions" (Ministry of Education and Culture, 2022), teachers implemented mixed online-offline and hybrid learning. Comparing three learning modes, teachers felt more convenient using mixed online-offline, which is in line with the previous studies (Ghazi-Saidi et al., 2020; Muthuprasad et al., 2021).

FIGURE 1
FIVE LEARNING ELEMENTS SUPPORTING THE ACHIEVEMENT OF LEARNING OBJECTIVE

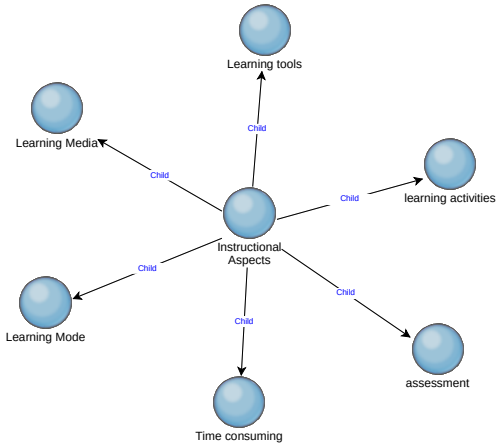
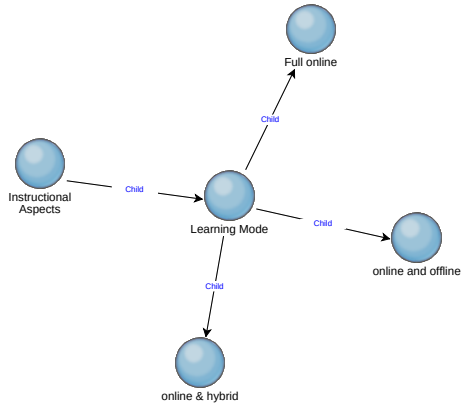
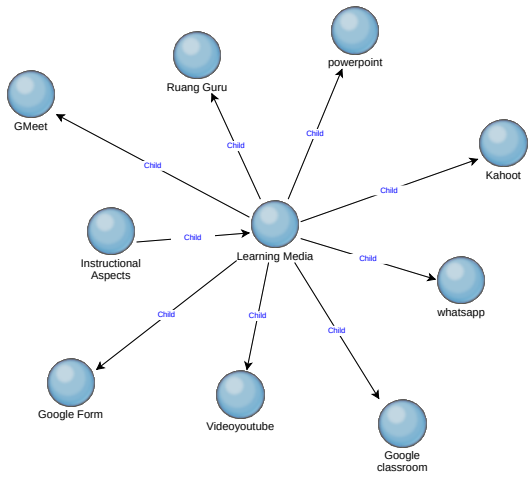


FIGURE 2
TYPES OF LEARNING MODES USED BY THE TEACHERS



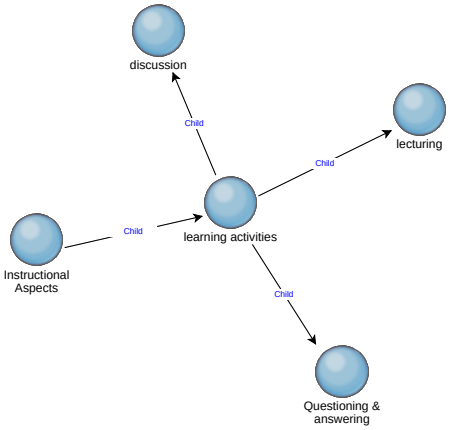
Regarding the learning media, we identified eight learning media/learning platforms used by teachers to support their teaching: GMeet, Powerpoint, Google Classroom, Google Form, Whatsapp, Video YouTube, Kahoot, and Ruang Guru, see Figure 3. Teachers often used learning videos downloaded through YouTube and/or created by the teacher as media to introduce the problem and visualisation representing the mathematical concepts. To support the teacher's explanation in the created video, some teachers used a certain software/application tool, GeoGebra, as this app has excellent features such as construction dan dragging tools to help students understand the concepts (Anwar et al., 2022). Some teachers preferred to use ready instructional videos because it was more effective than those made by teachers. These facts were in line with previous studies (Al-Zain & Al-Osaimi, 2021; Brame, 2015, 2016; Cuccurullo & Cinganotto, 2015). Some teachers created their learning videos to support their online learning. Using their video was more convenient as it offered some advantages, such as the flexibility of duration and contents (Syaripuddin et al., 2019). The created video explained the concepts and step-by-step procedure for solving the problem. The teacher also often used Whatsapp and google Forms as media to send tasks, learning videos, and assessments and collect students' answers to assignments or tests.

FIGURE 3
LEARNING MEDIA USED BY THE TEACHERS



In the context of learning activities, we identified three main activities used by the teachers: questioning and Answering (Q&A), Discussion, and Lecturing/teaching (see Figure 4). We found that the questioning and answering activities were used more often than others as it was more convenient, which was in line with the findings of the study by Mills et al. (2015) and Kuhn (2007). The teacher used GMeet, Zoom, or Classroom app to conduct the question and Answering method. The teacher who found difficulties in conducting fully online teaching and learning because of internet access implemented the lecturing method by recording the lecture and sending the recorded video to the students via parents' Whatsapp application. However, the duration of the videos was limited to around 15 minutes. Another issue was that most students did not watch the video for some reason, such as the students' limited access to their parent's mobile phones.

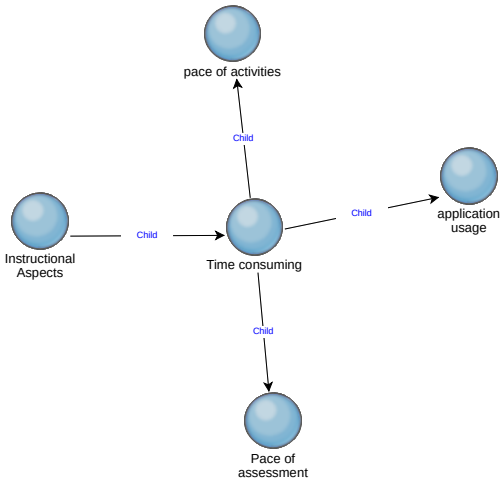
FIGURE 4
TYPES OF LEARNING ACTIVITIES USED DURING ONLINE LEARNING



During online learning, the duration of online teaching and learning was limited for some reason, such as limited data access. We found some consequences of this limitation, namely the pace of activities, assessments, and application usage, see Figure 5. This situation might affect the rate of activities, application usage, and pace of evaluation. In everyday situations, the instructional duration was around 40-50 minutes per hour, but during online learning, the time was shorter, about 10-15 minutes per hour. This

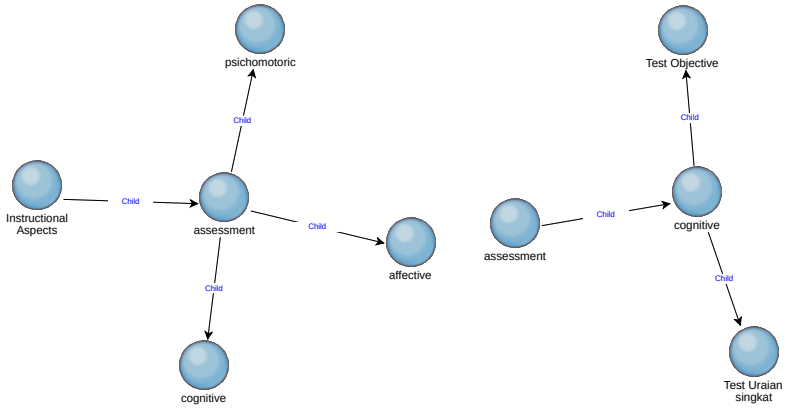
limited duration of instruction influenced the achievement of learning objectives. In this situation, teachers decided to focus on some essential topics or learning materials to be taught. We also identified several barriers faced by the teachers in explaining mathematical concepts or supporting students' understanding (Bender et al., 2004; Calafiore & Damianov, 2011; DiBiase, 2000).

FIGURE 5
TIME-CONSUMING DURING ONLINE LEARNING



To assess the quality of learning, the teachers attempted to assess all aspects, such as affective, cognitive, and phsycomoric (Sa'dijah et al., 2016, 2018); see Figure 6. Our findings indicate that the validity and effectiveness of the implementation were questionable for some reasons; for instance, some students' answers were identified as parents' works, and some students could not use the assessment tools/applications (Mukhtar et al., 2020). The teachers used some strategies to minimize these issues (e.g., cheating). For instance, the teachers who combined online and offline learning asked the students the explain their answers orally during the face-to-face meeting for clarification. Meanwhile, teachers who used online learning mode asked students to activate the camera and mic during the examination, which aligns with the study conducted by Tan et al. (2021).

FIGURE 6
ASSESSMENT INSTRUMENTS USED DURING ONLINE LEARNING



CONCLUSION

The quantitative results indicate that teachers' difficulties relate to their school type, academic degree, and professional qualification. Our findings showed that five main instructional aspects might affect the success of teaching and learning during the pandemic era: learning modes, learning activities, learning media, learning tools, assessment, and time consumption. These findings indicate some consequences to be considered by the teacher, curriculum developers, or other stakeholders in education. Firstly, the curriculum should be more flexible and adaptive to the new normal of education. Secondly, the flexibility of teaching and learning mode and school regulation should be adaptive to the students' characters for several aspects such as economic background, access to the internet, level of cognition, learning experiences, etc. Thirdly, improving teachers' capability to use technology applications should be supported and accelerated. Fourthly, providing free and open access to educational resources would reduce the operational costs of online learning. Fifth, parents' engagement during online teaching and learning would support improving online learning and teaching quality and effectiveness. Sixth, preparing pre-service mathematics teachers to be capable of using or developing adaptive learning means used in both learning modes.

This current study has some limitations that might affect the quality of the findings. Firstly, this quantitative data sample was relatively small (n=45) and might only represent mathematics teachers at secondary schools in Malang and Batu cities, east Java, Indonesia. For this reason, future quantitative research should involve a larger sample representing Indonesian mathematics teachers. Secondly, the qualitative data of this current study only were based on the teachers' perceptions which might unpack the natural barriers to achieving the learning objectives, for instance, the students' and parents' perceptions. For this reason, future research should address not only the teachers' perceptions but also the perceptions of students and parents about implementing online learning.

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REFERENCES

Aljandali, A. (2017). *Multivariate Methods and Forecasting with IBM® SPSS® Statistics*. Springer.

Al-Zain, A.O., & Al-Osaimi, T.M. (2021). Effectiveness of using an instructional video in teaching light-curing technique. *Advances in Medical Education and Practice*, *12*, 289–302. https://doi.org/10.2147/AMEP.S298556

Anwar, L., Mali, A., & Goedhart, M. (2022). Formulating a conjecture through an identification of robust invariants with a dynamic geometry system. *International Journal of Mathematical Education in Science and Technology*. https://doi.org/10.1080/0020739X.2022.2144517

Anwar, L., Mali, A., & Goedhart, M.J. (2021). The Effect of Proof Format on Reading Comprehension of Geometry Proof: The Case of Indonesian Prospective Mathematics Teachers. *Eurasia Journal of Mathematics, Science and Technology Education*, *17*(4), 1–15. https://doi.org/10.29333/EJMSTE/10782

Azhari, B., & Fajri, I. (2022). Distance learning during the COVID-19 pandemic: School closure in Indonesia. *International Journal of Mathematical Education in Science and Technology*, *53*(7), 1934–1954. https://doi.org/10.1080/0020739X.2021.1875072

Bawa'aneh, M.S. (2021). Distance learning during COVID-19 pandemic in UAE public schools: Student satisfaction, attitudes and challenges. *Contemporary Educational Technology*, *13*(3). https://doi.org/10.30935/cedtech/10872

Bender, D.M., Wood, B.J., & Vredevoogd, J.D. (2004). Teaching Time: Distance Education Versus Classroom Instruction. *International Journal of Phytoremediation, 21*(1), 103–114. https://doi.org/10.1207/s15389286ajde1802_4

Brame, C J. (2016). Effective educational videos: Principles and guidelines for maximizing student learning from video content. *CBE Life Sciences Education, 15*(4), es6.1–es6.6. https://doi.org/10.1187/cbe.16-03-0125

Brame, C.J. (2015). Effective Educational Videos. In *Vanderbuilt University Center for Teaching* (pp. 1–8). Retrieved from http://groups.csail.mit.edu/uid/other-

Cairney-Hill, J., Edwards, A.E., Jaafar, N., Gunganah, K., Macavei, V.M., & Khanji, M.Y. (2021). Challenges and opportunities for undergraduate clinical teaching during and beyond the COVID-19 pandemic. *Journal of the Royal Society of Medicine*, *114*(3), 113–116. https://doi.org/10.1177/0141076820980714

Calafiore, P., & Damianov, D.S. (2011). The effect of time spent online on student achievement in online economics and finance courses. *Journal of Economic Education*, *42*(3), 209–223. https://doi.org/10.1080/00220485.2011.581934

Creswell, J.W. (2012). Educational Research. In *AORN Journal* (Fourth, Vol. 62, Issue 1). Pearson.

Cuccurullo, D., & Cinganotto, L. (2015). The role of videos in teaching and learning content in a foreign language. *Journal of E-Learning and Knowledge Society Je-LKS The Italian e-Learning Association Journal*, *11*(2), 49–62. https://doi.org/10.20368/1971-8829/1024

Davis, L., Sun, Q., Lone, T., Levi, A., & Xu, P. (2022). In the Storm of COVID-19: College Students' Perceived Challenges With Virtual Learning. *Journal of Higher Education Theory and Practice*, *22*(1), 66–82. https://doi.org/10.33423/jhetp.v22i1.4964

DiBiase, D. (2000). Is distance teaching more work or less work? *International Journal of Phytoremediation*, *21*(1), 6–20. https://doi.org/10.1080/08923640009527061

Ford, T.G., Kwon, K.-A., & Tsotsoros, J.D. (2021). Early childhood distance learning in the U.S. during the COVID pandemic: Challenges and opportunities. *Children and Youth Services Review*, *131*, 106297. https://doi.org/https://doi.org/10.1016/j.childyouth.2021.106297

Ghazi-Saidi, L., Criffield, A., Kracl, C.L., Mckelvey, M., Obasi, S.N., & Vu, P. (2020). Moving from Face-to-Face to Remote Instruction in a Higher Education Institution during a Pandemic: Multiple Case Studies Moving from face-to-face to remote instruction in a higher education institution during a pandemic: Multiple case studies Moving from. *International Journal of Technology in Education and Science (IJTES)*, *4*(4), 2020. Retrieved from www.ijtes.net

Giatman, M., Siswati, S., & Basri, I.Y. (2020). *Online Learning Quality Control in the Pandemic Covid-19 Era in Indonesia*, *2*, 168–175. https://doi.org/10.15294/jne.v6i2.25594

Guangul, F.M., Suhail, A.H., Khalit, M.I., & Khidhir, B.A. (2020). Challenges of remote assessment in higher education in the context of COVID-19: A case study of Middle East College. *Educational Assessment, Evaluation and Accountability*, *32*(4), 519–535. https://doi.org/10.1007/s11092-020-09340-w

Gurung, D.S. (2021). Challanges faced by teachers in online teaching during Covid-19 pandemic. *The Online Journal of Distance Education and E-Learning*, *9*(1), 8–18. https://orcid.org/0000-0002-2734-2268

Gustiani, S., & Sriwijaya, P.N. (2020). Students' Motivation in Online Learning During Covid-19 Pandemic Era: A Case Study. *Holistic Journal*, *12*(2).

Kamal, T., & Illiyan, A. (2021). School teachers' perception and challenges towards online teaching during COVID-19 pandemic in India: An econometric analysis. *Asian Association of Open Universities Journal*, *16*(3), 311–325. https://doi.org/10.1108/AAOUJ-10-2021-0122

Kementerian Sekretariat Negara Republik Indonesia. (2020). *Pembatasan Sosial Berskala Besar Dalam Rangka Percepatan Penanganan Corona Wrus Disease 2019 (Covid-19)*.

Korstjens, I., & Moser, A. (2018). Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing. *European Journal of General Practice*, *24*(1), 120–124. https://doi.org/10.1080/13814788.2017.1375092

Kuhn, D. (2007). Is direct instruction an answer to the right question? In *Educational Psychologist* (Vol. 42, Issue 2, pp. 109–113). Routledge. https://doi.org/10.1080/00461520701263376

Limbong, M., Jitu, &, & Lumbantoruan, H. (2022). *The Effect of Government Teacher Certification on Teaching Performance: Certified vs uncertified ARTICLE HISTORY*, *4*(3), 186–191. https://doi.org/10.31849/utamax.vxxx

Mills, S.R., Rice, C.T., Berliner, D.C., & Rosseau, E.W. (2015). The correspondence between teacher questions and student answers in classroom discourse. *Journal of Experimental Education*, *48*(3), 194–204. https://doi.org/10.1080/00220973.1980.11011735

Ministry of Education and Culture. (2020). *Pedoman Penyelenggaraan Belajar Dari Rumah Dalam Masa Darurat Penyebaran Corona Virus Disease (Covid-19)*. Retrieved from http://aksi.puspendik.kemdi

Ministry of Education and Culture. (2022). *Diskresi Pelaksanaan Keputusan Bersama 4 (Empat) Menteri Tentang Panduan Penyelenggaraan Pembelajaran Di Masa Pandemi Coronavirus Disease 2019 (Covid-19)*.

Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Educational Research Open*, *1*. https://doi.org/10.1016/j.ijedro.2020.100012

Mukhtar, K., Javed, K., Arooj, M., & Sethi, A. (2020). Advantages, limitations and recommendations for online learning during covid-19 pandemic era. *Pakistan Journal of Medical Sciences*, *36*(COVID19-S4), S27–S31. https://doi.org/10.12669/pjms.36.COVID19-S4.2785

Muthuprasad, T., Aiswarya, S., Aditya, K.S., & Jha, G.K. (2021). Students' perception and preference for online education in India during COVID -19 pandemic. *Social Sciences & Humanities Open*, *3*(1), 100101. https://doi.org/10.1016/j.ssaho.2020.100101

Nowell, L.S., Norris, J.M., White, D.E., & Moules, N.J. (2017). Thematic Analysis: Striving to Meet the Trustworthiness Criteria. *International Journal of Qualitative Methods*, *16*(1). https://doi.org/10.1177/1609406917733847

Özüdoğru, G. (2021). Problems faced in distance education during Covid-19 Pandemic. *Participatory Educational Research*, *8*(4), 321–333. https://doi.org/10.17275/per.21.92.8.4

Perwitasari, F., Astuti, N.B., Atmojo, S., Asesmen, P., & Pembelajaran, D. (2021). *Online Learning and Assessment: Challenges and Opportunities during Pandemic COVID-19 (Nationwide Survey of Teachers in Indonesia)*.

Purnomo, H., Sa'dijah, C., Hidayanto, E., Sisworo, Permadi, H., & Anwar, L. (2022). Development of Instrument Numeracy Skills Test of Minimum Competency Assessment (MCA) in Indonesia. *International Journal of Instruction*, *15*(3), 635–648. https://doi.org/10.29333/iji.2022.15335a

Richardson, J.W., Lingat, J.E.M., Hollis, E., College, R., & Pritchard, M. (2020). Shifting teaching and learning in online learning spaces: An investigation of a faculty online teaching and learning initiative. *Online Learning Journal*, *24*(1), 67–91. https://doi.org/10.24059/olj.v24i1.1629

Sa'dijah, C., Afriyani, D., Subanji, Muksar, M., & Anwar, L. (2018). Assessing students' pseudo-mathematical translation using translation-verification model. *AIP Conference Proceedings*, pp. 1–9. https://doi.org/10.1063/1.5054548

Sa'dijah, C., Rafiah, H., Gipayana., M., Qohar, A., & Anwar, L. (2016). Asesmen pemecahan masalah. *Sekolah Dasar*, *25*(2), 147–159.

Saldaña, J. (2013). The coding manual for qualitative researchers. Retrieved from amazon.com

Sinulingga, A., & Simatupang, N. (2019). *The Difference Between Certified and Non-certified PE Teachers Performance Based on Range of Service Period*.

Slack, H.R., & Priestley, M. (2022). Online learning and assessment during the Covid-19 pandemic: Exploring the impact on undergraduate student well-being. *Assessment and Evaluation in Higher Education*. https://doi.org/10.1080/02602938.2022.2076804

Syaripuddin, R., Razaq Ahmad, A., & Mahzan Awang, M. (2019). *The Use of Video in Teaching and Learning 21st Century History Education in Malaysia*, pp. 182–186. https://doi.org/10.32698/gcs.0194

Tan, C.Y.A., Swe, K.M.M., & Poulsaeman, V. (2021). Online examination: A feasible alternative during COVID-19 lockdown. *Quality Assurance in Education*, *29*(4), 550–557. https://doi.org/10.1108/QAE-09-2020-0112

Visser, J.A. (2000). Faculty work in developing and teaching web–based distance courses: A case study of time and effort. *International Journal of Phytoremediation*, *21*(1), 21–32. https://doi.org/10.1080/08923640009527062

Wallace, D., Juban, R., & Vicknair, J. (2022). Success in the Online Classroom: Lessons Learned. *Journal of Higher Education Theory and Practice*, *22*(7), 141–145. https://doi.org/10.33423/jhetp.v22i7.5279

WHO (World Health Organization). (2019). *Coronavirus disease (COVID-19) advice for the public.*

Yan, H., Zhang, H., & Lam, J.F.I. (2022). A Qualitative Study on the Model of Factors Influencing Online Interactivity and Student Learning Engagement in the Post-Pandemic Era. *Journal of Higher Education Theory and Practice*, *22*(17), 45–62. https://doi.org/10.33423/jhetp.v22i17.5657