

Covid 19 Pandemic Challenges: Teacher Leadership as an Agent of Instructional Change

Adawati Suhaili^{1*}, Kamisah Osman², Mohd. Effendi @ Ewan Mohd. Matore²

¹Institut Aminuddin Baki Sarawak Branch, Malaysia

²Faculty of Education, National University of Malaysia, Bangi, Selangor, Malaysia

Corresponding author: adawati@iab.edu.my

Article Info

Page Number: 2026 – 2035

Publication Issue:

Vol. 71 No. 3s2 (2022)

Abstract

The COVID-19 pandemic that will strike the world in 2020 has forced school closures. Indirectly, the pandemic's impact produced management inconsistencies throughout the global education system. Based on this condition, quick help for school management and leadership is required. It is imperative that teacher leadership efforts be developed immediately to lead reforms in teaching and learning, which is critical in dealing with the issue of student dropout throughout the epidemic. Through a review of prior studies, the goal of this paper is to address the development of teacher leadership competencies as an effective agent of instructional change during the pandemic. The content analysis method was utilised to analyse this survey. According to the findings of the content analysis, even if most students have difficulty accessing the internet, effective teacher leadership skills may ensure that students accomplish good learning. A new method based on technology support from home is required to improve students' teaching and learning processes. Furthermore, close collaboration with parents or guardians to carry out their roles in dealing with problems in student learning is a crucial aspect in ensuring that the learning process occurs more efficiently. In the face of the epidemic, this study indicated that there are still numerous impediments and problems in developing teacher leadership competencies as effective agents of instructional change. As a result, additional exclusive investigations must be conducted as soon as possible. More research is needed to see the perspective of teacher leadership development as an effective agent in instructional change across the country and using different study approaches.

Article History

Article Received: 22 April 2022

Revised: 10 May 2022

Accepted: 15 June 2022

Publication: 19 July 2022

Keywords: Agents of change, role of technology, teacher leadership competency, pandemic Covid-19, instructional leadership.

Introduction:

The emergence of Novel Coronavirus 2019 or COVID-19, which was originally found in Wuhan District, Hubei Province, China, has taken us by surprise (Lin et al., 2020; Liu et al., 2020; Song et al., 2020). This virus's outbreak is capable of endangering people's bodily and psychological health, and it has the potential to spread fast until it is labelled a global pandemic by the World Health Organization (WHO) (Buheji et al., 2020). The virus's outbreak has put pressure and a negative impact on human life in many areas, including the economy, social

activities, health, education, politics, and culture (He et al., 2020; Sarkodie & Owusu, 2021; Wang et al., 2020).

The pattern of educational management that includes students, parents, and instructors has been indirectly impacted by the COVID-19 pandemic. The delivery of teaching and learning has been negatively impacted because of the incoherence of management within the education system and the leadership ability of teachers in managing teaching and learning throughout the epidemic (Antonopoulou et al., 2021; Harris, 2020; McNamara, 2021). As a result, educators ought to broaden the scope of the social network by fostering a greater level of participation from parents in the process of easing the implementation of teaching and learning throughout the pandemic. It is time for education systems all over the world to generate a sense of urgency to act in driving changes that are relevant to the current circumstances. This should be done to ensure that school kids do not fall behind in their education or stop learning altogether.

Considering this circumstance, the capacity of teacher leadership to generate a sense of urgency in driving changes in teaching and learning is an essential component in the process of resolving difficulties pertaining to student learning (UNESCO, 2020). Teachers who are accustomed to adapting innovative learning, practising a variety of learning strategies, and putting an emphasis on student autonomy in organising their learning before school closure are more likely to adapt more easily to work in the new context of distance learning in the event of a pandemic. This is because teachers who are accustomed to these things are more likely to have students who are self-directed learners (Ehren et al., 2021). Therefore, teacher leadership competence as an effective agent of instructional change during the COVID-19 pandemic is a critical factor that must be paid attention to. This attention is required since it is a factor that needs to be paid attention to.

Background of the Study:

As the primary change agent who leads and sustains significant change in schools (Anderson, 2018; Khanyi & Naidoo, 2020; Kiliç, 2014), teacher leadership is crucial. Teacher leadership is defined by Katzenmeyer and Moller (2009) as a process carried out by teachers, individually or collectively, who can influence colleagues, principals, and other members of the school community as well as those beyond the school (Katzenmeyer & Moller, 2009). The influence refers to the process of improving teaching and learning to improve student achievement, teacher effectiveness, and overall school development.

In this context, teacher leadership, also known as learning leadership, consists of five principles: (i) focusing on learning as an activity; (ii) creating good learning conditions; (iii) encouraging discussion about leadership and learning; (iv) sharing leadership; and (v) sharing roles and responsibilities to achieve results. As a result, being an agent of change in the teacher's practise centred on student learning necessitates increased cooperation and unity among teachers, having positive attitudes toward the responsibilities assumed, and having a thorough understanding of the vision to be realised (Brodie, 2021; Meyer & Slater-Brown, 2020) ; Thornton, 2014). According to Aguayo Chan et al. (2020), teachers are leaders both within and beyond the classroom because their influence is so powerful in building a culture that promotes learning and organising for learning. The seven main domains of teacher leadership as agents of change were first introduced by Cosenza (2015). These domains are as

follows: (i) fostering a collaborative culture to support the development of educators and student learning; (ii) accessing and using research to improve student practise and learning; (iii) promoting professional learning for continuous improvement; (iv) facilitation in teaching and student learning; (v) using assessment data for school and district improvement; (vi) increase outreach and collaboration with families and communities; and (vii) support student learning and the teaching profession.

In addition, the concept of instructional leadership, also known as pedagogical leadership or learning leadership, recognises that the leadership of educators is one of the fundamental means by which to improve the overall quality of educational opportunities and to drive change (Cheung et al., 2018). This academic identifies the educator as the primary factor that contributes to the quality of the educational experience for students. The ability for teacher leadership to act as an agent of change is considered as extremely crucial in the process of altering the education system to ensure that it will continue to be relevant to the requirements of students in the foreseeable future. Therefore, in order to achieve beneficial results and be in a position to enhance the overall quality of the student's life, it is imperative that the leadership skills of the instructor be developed (Harris & Jones, 2019). For the purpose of managing and leading changes in educational patterns in the midst of the COVID-19 epidemic that is sweeping the world, a significant emphasis is placed on information and communication technology integration abilities among teacher leaders (OECD, 2020). As a result, the purpose of this piece of writing is to concentrate on the most recent research about the function of teacher leadership as an efficient instructional change agent in the process of adapting in the face of a pandemic scenario.

Methodology:

The researcher employed the content analysis method in this investigation. A study method known as content analysis links the text's meaning or purpose to the context in which it was used (Krippendorff 2004). Following that, researchers used theme analysis to examine the information they had acquired from the literature review.

Results and Analysis:

Table 1. Results from a literature review

Researcher	Results
Aguayo Chan et al. (2020)	<ul style="list-style-type: none"> • The requirement for a new approach leveraging technology support at home to enhance student teaching and learning. • Most students have trouble accessing the internet, but teachers with strong leadership skills can make sure that students get the education they need. • The best technique to enhance learning has been considered by teacher leaders in the implementation of teaching and learning during the epidemic.
Berry et al. (2020)	<ul style="list-style-type: none"> • School leaders play a crucial role in assisting teacher leaders in sharing their knowledge and leadership. • The idea of teacher leadership in the educational system needs to be strengthened.

	<ul style="list-style-type: none"> Teacher leaders need to reconsider committees and initiatives that help hasten the development of more inquiry-based learning patterns through online networks. The educational management and leadership structure needs to be transformed to enable teacher leaders to both educate and lead.
Ehren et al. (2021)	<ul style="list-style-type: none"> The urgent need to change the way that education is delivered, particularly how teaching and learning are conducted online. Recognizing the value of teacher leadership is crucial for overcoming the difficulties presented by the COVID-19 pandemic. More research is required to understand the context of teacher leadership in dealing with different difficulties in the educational system.
Pandey (2021)	<ul style="list-style-type: none"> Teacher leadership is defined as teachers' proactive participation in leading students and parents, actions they take, and assistance they provide. The setting of teacher leadership is critical in enabling the sharing of elements or attempts to support school management's leadership role and lead colleagues. The school can assist teacher leadership by advising how teacher leaders can obtain solid support, particularly in terms of motivation and the ability to lead during and after the ongoing crisis.
Hanafi et al. 2021	<ul style="list-style-type: none"> Parental collaboration and support for student learning while students are at home, this is a crucial aspect in ensuring that they learn more effectively.

Based on the content analysis of five research, as shown in Table 1, it was discovered that teacher leadership in boosting instructional efficacy during the pandemic requires careful consideration. The following are the findings of the study.

4.1. Role of Teacher Leadership

During the COVID-19 epidemic, changing patterns in the education system make teacher leadership a very relevant topic to be examined, particularly in the dimension of action and producing a diversity of pedagogical tactics. This makes teacher leadership a very relevant subject to be studied. Because of this, the context of the changes that need to take place in the practice of teacher education must be different from how things were before the pandemic. To get ready for and generate a sense of urgency with the help of innovative strategies and alternative models, teachers should try to acquire new skills and knowledge and change their attitudes. This can be accomplished through teaching with the help of information and communication technology skills, which trains students to be more proactive and responsible in their own learning. Therefore, efficient, and effective teacher leadership should focus on the use of information and communications technology (ICT) by students both inside and outside of the classroom. This should be done in addition to strengthening the teacher's skills in the use of ICT to effectively teach a variety of subjects.

One of the most significant implications and problems of COVID-19 in the education system is the requirement for a new method to be applied in schools using technology help from home to improve students' teaching and learning processes (Aguayo Chan et al., 2020). According to the study's conclusions, online learning has become widespread. The study's findings suggest that video lectures have become a popular online teaching approach, but online learning works

best when students communicate two-way with others while learning (Rosenthal & Walker, 2020). This research demonstrates that face-to-face lectures are more effective than video-based lectures because attentiveness, positive emotions, experience sharing, presence, and social interaction may be felt during face-to-face lectures. While the findings of Hanafi et al. (2021) revealed that there are still fewer features and structures of teaching and learning practised in Indonesian Islamic boarding schools (pesantren). Based on the findings of this study, school leaders and teacher leaders should run continuous development programmes or provide training to teachers to integrate blended learning. This study's findings also indicate that school administrators give complete technical facilities in pesantren to promote blended learning more effectively.

4.2. Teacher Leadership Concept

Berry et al. (2020) discovered that the concept of teacher leadership in the education system must be enhanced. These researchers propose that actions be taken to detect how teachers lead and acknowledge them in various ways. According to these experts, school leaders play a critical role in assisting teacher leaders in spreading their expertise and leadership. Informing school members, parents, and policymakers on the value and needs of teacher leadership is one way that can be used. It is recommended that school administrators conduct an online survey to record how teacher leaders manage and lead innovation in teaching and learning during school closures. Furthermore, these researchers propose that schools provide opportunity for teacher leaders to develop new programmes to address children's social-emotional academic requirements when they return to school. With the full collaboration of educators, the government is also encouraged to increase internet access and ensure that every student and family has access to hardware, software, and broadband networks.

Berry et al. (2020) discovered that teacher leaders must reconsider committees and programmes that might speed up the process of transitioning from a more meaningful learning pattern to an inquiry approach via online networks. The school system must develop and implement a standard of teacher leadership competence, as well as how teachers practise and distribute their knowledge. To stimulate innovation, school systems must reallocate time and teaching schedules to boost research or action research led by teacher leaders. Teacher leadership is expected to improve and update innovation in evaluation and assessment in the educational system. This project has the potential to strengthen teacher leaders' accountability in an education system that promotes student accomplishment. According to the findings of this study, the transformation of the education system from pre-school to higher education level requires some changes in terms of physical, social-emotional health support, after-school programmes, and the work schedule of teacher leaders so that they can teach and lead at the same time. In acknowledgment of teacher leadership, this researcher also proposed that the government provide incentives to teacher leaders at all levels, including preschool, primary school, high school, university, community and technical college, and other professional training institutes. The COVID-19 epidemic has impacted and increased complexity and uncertainty in school administration, necessitating collaboration at all levels of education leaders, including teacher leaders. This relationship is vital for achieving the objective of educational change.

Meanwhile, Ehren et al. (2021) discovered that school closures induced by the COVID-19 epidemic necessitated a quick adjustment in the education system's delivery pattern, particularly the delivery of teaching and learning to an online method. Online teaching and learning with teacher support takes place in the homes of the students. Due to a lack of access to teachers and schools in the early phases of school closures, pupils dropped out of learning due to instability in the teacher's online delivery pattern. The favourable response to this transition has put teachers' leadership competency to the test, both individually and collectively. According to the conclusions of the study by Ehren et al. (2021), knowing the value of teacher leadership is critical in tackling the problems of the pandemic. According to the case study report produced by these researchers, there is a need to further investigate the context of teacher leadership in the face of diverse issues in the educational system. This endeavour is required to achieve ongoing improvement in educational delivery to ensure that all students receive a fair and equitable education.

Teacher leadership has been redefined, according to Pandey (2021), from a role or position as a leader who has gone through an official appointment such as a subject coordinator to a broader teacher leadership. He defined teacher leadership as the proactive role that teachers play, the actions they take, and the assistance they provide in leading students and parents. Teacher leadership is also defined as an action that can keep colleagues' respect and faith in them. The COVID-19 pandemic has created new spaces and opportunities for many teachers, who have demonstrated their ability to face the crisis, lead the design of curriculum content, facilitate increased capacity as colleagues' leaders and mentors, and easily adapt and be a catalyst for change in the school organisation. The setting of teacher leadership is critical in enabling the sharing of elements or attempts to support school management's leadership role and lead colleagues. Pandey (2021) also stated that schools may promote teacher leadership by proposing robust support, particularly in terms of motivation and the ability to lead during and after the ongoing crisis. As a result, despite the pandemic condition, the leadership competency of teachers to increase the quality of student learning should be investigated further to ensure that student achievement occurs continually and to avoid falling out of the education system.

4.3. Teacher Leadership's Effectiveness During the Pandemic

(i) Diverse Strategies for Teaching and Learning

Aguayo Chan et al. (2020) discovered that, while many students struggle with internet access, great teacher leadership skills may ensure that students accomplish good learning by utilising available means such as smartphones, televisions, and video conferencing. As teacher leaders, they also experiment with diverse pedagogical strategies, teaching planning, intervention, and learning assessment. Furthermore, this study discovered that teaching techniques are designed, implemented, and assessed based on the teacher leader's perception. As a result, Pandey (2021) underlined that teacher leaders should constantly be willing to learn and take advantage of opportunities to increase personal competency. The best strategy to improve learning has been considered by teacher leaders in the implementation of teaching and learning during the pandemic. Sharing their leadership with parents who wish to focus action on student learning is the strategy.

(ii) Excellent Parental Collaboration

Pandey (2021) highlighted that collaboration with colleagues and parents to overcome issues in the implementation of student learning sessions during the COVID-19 crisis is how teacher leaders demonstrate leadership during the pandemic. During the COVID-19 pandemic, teacher leaders showed a good example by working closely with parents or guardians to carry out their obligations in addressing student learning issues. Pandey (2021) describes the hurdles and obstacles that teacher leaders experience in their leadership duties, which can be addressed with the help of parents or guardians when dealing with pandemic challenges. Aside from the challenges and constraints already mentioned, a poll conducted by Pandey (2021) discovered that the greatest challenge is ensuring the consistent involvement of parents of students in accountability for their children's learning during the pandemic. To ensure that this involvement continues, he emphasised that teacher leaders must provide a proper platform for parents to ask questions and deepen their comprehension of their child's learning. In fact, this viewpoint is corroborated by the findings of Hanafi et al. (2021), who discovered that parental cooperation and support for student learning throughout the pandemic played a significant influence.

Discussion:

Among the primary themes mentioned in earlier research about teacher leadership as an agent of change, teacher leadership is critical in enhancing the level of student learning throughout the epidemic (Aguayo Chan et al. 2020; Berry et al. 2020; Ehren et al. 2021; Hanafi 2021; Pandey 2021). This role is like that argued by previous scholars and researchers who discovered that teacher leadership refers to the practise of improvement in teaching and learning that aims to improve student learning and achievement, increase the effectiveness of teacher teaching, and overall school development (Brodie, 2021; Katzenmeyer, M., & Moller, 2009; Meyer & Slater-Brown, 2020; Harris & Jones, 2019; Thornton, 2014).

The findings of this survey also suggest that, in the face of the epidemic, there are still numerous impediments and problems in establishing teacher leadership competencies as effective agents of instructional change. This is related to the teaching and learning delivery pattern, which is more of an inquiry method via online networks (Akhter, 2021; Saminathan, 2021). This teaching and learning strategy necessitates teacher leaders mastering information, skills, and changing attitudes in order to prepare and create urgency through the use of new tactics and alternative models, such as teaching through the use of ICT skills (Delcker & Ifenthaler, 2021; Natarajan & Laxman, 2021; Haghbayan et al, 2021). Changes in handling and learning during the pandemic necessitate close collaboration with parents or guardians in order to carry out their obligations and address obstacles in student learning. Teachers' teaching and learning approaches have undergone drastic modifications as a result of the COVID-19 pandemic. This circumstance necessitates the immediate and continual implementation of teacher leadership competency development.

Conclusion:

The Covid-19 pandemic that has ravaged the entire country has highlighted the critical importance of empowering teacher leadership. This is due to the expectation that empowering teacher leadership will create an impetus to drive reforms in teaching and learning throughout

the pandemic. Previous research findings have also demonstrated the importance of teacher leadership in dealing with student learning challenges. Teacher leaders must take into account the best ways to improve learning when implementing teaching and learning throughout the pandemic (last sentence). Support from school leaders in optimising expertise and promoting the value of teacher leadership is a critical aspect in expanding the effect of teacher leadership (reinforcing sentence). The environment of teacher leadership is critical for supporting school management's leadership role and leading colleagues to ensure that the aims of change in the education system are executed efficiently and effectively. Teacher leadership development should be prioritised during the pandemic to reduce student dropout. As a result, policymakers and stakeholders should pay close attention to measures to enhance and empower teacher leadership in order to strengthen the education system over time. To preserve research on the impact and significance of teacher leadership competence as a change agent mobilising effective education during or after the epidemic, it must be examined continually and in depth.

References

- [1] Aguayo Chan, J. C., Espejel López, M. V., Pinto Loria, M. de L., & Briceño, E. D. (2020). The Hard Teacher's Leadership Coping to the COVID-19 Pandemic. *World Journal of Education*, 10(6), 55. <https://doi.org/10.5430/wje.v10n6p55>
- [2] Akhter, T. (2021). Problems and challenges faced by EFL students of Saudi Arabia during COVID-19 pandemic. *Rupkatha Journal on Interdisciplinary Studies in Humanities*, 12(5). <https://doi.org/10.21659/RUPKATHA.V12N5.RIOC1S23N5>
- [3] Anderson, K. D. (2018). Transformational Teacher Leadership in Rural Schools. *The Rural Educator*, 29(3). <https://doi.org/10.35608/ruraled.v29i3.462>
- [4] Pawan Kumar Tiwari, Mukesh Kumar Yadav, R. K. G. A. . (2022). Design Simulation and Review of Solar PV Power Forecasting Using Computing Techniques. *International Journal on Recent Technologies in Mechanical and Electrical Engineering*, 9(5), 18–27. <https://doi.org/10.17762/ijrmee.v9i5.370>
- [5] Antonopoulou, H., Halkiopoulos, C., Barlou, O., & Beligiannis, G. N. (2021). Transformational leadership and digital skills in higher education institutes: During the covid-19 pandemic. *Emerging Science Journal*, 5(1), 1–15. <https://doi.org/10.28991/esj-2021-01252>
- [6] Berry, B., Doucet, A., & Owens, B. (2020). Teacher Leadership in the Aftermath of the Pandemic: The Now, The Dance, The Transformation. <https://hundred.org/en/articles/teacher-leadership-in-the-aftermath-of-the-pandemic-the-now-the-dance-the-transformation#c497fb70>
- [7] Brodie, K. (2021). Teacher agency in professional learning communities. *Professional Development in Education*, 47(4), 560–573. <https://doi.org/10.1080/19415257.2019.1689523>
- [8] Buheji, M., da Costa Cunha, K., Beka, G., Mavrić, B., Leandro do Carmo de Souza, Y., Souza da Costa Silva, S., Hanafi, M., & Chetia Yein, T. (2020). The Extent of COVID-19 Pandemic Socio-Economic Impact on Global Poverty. *A Global Integrative Multidisciplinary Review. American Journal of Economics*, 10(4), 213–224. <https://doi.org/10.5923/j.economics.20201004.02>
- [9] Cheung, R., Reinhardt, T., Stone, E., & Little, J. W. (2018). Defining teacher leadership: A framework. In *Phi Delta Kappan* (Vol. 100, Issue 3, pp. 38–44).

<https://doi.org/10.1177/0031721718808263>

- [10] Bulla, P. . “Traffic Sign Detection and Recognition Based on Convolutional Neural Network”. *International Journal on Recent and Innovation Trends in Computing and Communication*, vol. 10, no. 4, Apr. 2022, pp. 43-53, doi:10.17762/ijritcc.v10i4.5533.
- [11] Cosenza, M. N. (2015). Defining teacher leadership: Affirming the teacher leader model standards. *Issues in Teacher Education*, 24(2), 79–99.
- [12] Delcker, J., & Ifenthaler, D. (2021). Teachers’ perspective on school development at German vocational schools during the Covid-19 pandemic. *Technology, Pedagogy and Education*, 30(1), 125–139. <https://doi.org/10.1080/1475939X.2020.1857826>
- [13] Ehren, M. C. M., Madrid, R., Romiti, S., Armstrong, P. W., Fisher, P., & McWhorter, D. L. (2021). Teaching in the COVID-19 era: Understanding the opportunities and barriers for teacher agency. *Perspectives in Education*, 39(1), 61–76. <https://doi.org/10.18820/2519593X/pie.v39.i1.5>
- [14] Harris, A. (2020). COVID-19 – school leadership in crisis? *Journal of Professional Capital and Community*, 5(3-4), 321–326. <https://doi.org/10.1108/JPCC-06-2020-0045>
- [15] Gupta, D. J. . (2022). A Study on Various Cloud Computing Technologies, Implementation Process, Categories and Application Use in Organisation. *International Journal on Future Revolution in Computer Science & Communication Engineering*, 8(1), 09–12. <https://doi.org/10.17762/ijfrcsce.v8i1.2064>
- [16] Harris, A., & Jones, M. (2019). Leading professional learning with impact. In *School Leadership and Management* (Vol. 39, Issue 1, pp. 1–4). <https://doi.org/10.1080/13632434.2018.1530892>
- [17] He, Q., Liu, J., Wang, S., & Yu, J. (2020). The impact of COVID-19 on stock markets. *Economic and Political Studies*, 275–288. <https://doi.org/10.1080/20954816.2020.1757570>
- [18] Katzenmeyer, M. & Moller, G. (2009). *Awakening the Sleeping Giant: Helping Teacher Develop as Leaders* (Third Edit). CA: Corwin Press, Inc.
- [19] Khanyi, J. G., & Naidoo, P. (2020). Principals’ role in leadership capacity development of post level one teachers for school leadership. *Perspectives in Education*, 8(2), 168–184. <https://doi.org/10.18820/2519593X/PIE.V38.I2.11>
- [20] J. . Hermina, N. S. . Karpagam, P. . Deepika, D. S. . Jeslet, and D. Komarasamy, “A Novel Approach to Detect Social Distancing Among People in College Campus”, *Int J Intell Syst Appl Eng*, vol. 10, no. 2, pp. 153–158, May 2022.
- [21] Kiliñç, A. Ç. (2014). Examining the relationship between teacher leadership and school climate. *Kuram ve Uygulamada Egitim Bilimleri*, 14(5), 1729–1742. <https://doi.org/10.12738/estp.2014.5.2159>
- [22] Lin, Q., Zhao, S., Gao, D., Lou, Y., Yang, S., Musa, S. S., Wang, M. H., Cai, Y., Wang, W., Yang, L., & He, D. (2020). A conceptual model for the coronavirus disease 2019 (COVID-19) outbreak in Wuhan, China with individual reaction and governmental action. *International Journal of Infectious Diseases*, 93, 211–216. <https://doi.org/10.1016/j.ijid.2020.02.058>
- [23] Liu, W., Zhang, Q., Chen, J., Xiang, R., Song, H., Shu, S., Chen, L., Liang, L., Zhou, J., You, L., Wu, P., Zhang, B., Lu, Y., Xia, L., Huang, L., Yang, Y., Liu, F., Semple, M. G., Cowling, B. J., ... Liu, Y. (2020). Detection of Covid-19 in Children in Early January 2020 in Wuhan, China. *New England Journal of Medicine*, 382(14), 1370–1371.

<https://doi.org/10.1056/nejmc2003717>

- [24]McNamara, A. (2021). Crisis management in higher education in the time of covid-19: The case of actor training. *Education Sciences*, 11(3). <https://doi.org/10.3390/educsci11030132>
- [25]Meyer, F., & Slater-Brown, K. (2020). Educational change doesn't come easy: lead teachers' work as change agents. *Mathematics Education Research Journal*. <https://doi.org/10.1007/s13394-020-00333-y>
- [26]Garg, K. . (2022). Beltrami's Conjecture. *International Journal on Recent Trends in Life Science and Mathematics*, 9(2), 33–40. <https://doi.org/10.17762/ijlsm.v9i2.133>
- [27]Natarajan, U., & Laxman, K. (2021). ICT Masterplans in Education: Singapore's Reform Efforts to Engage in a Post-COVID World. In *Lecture Notes in Educational Technology* (pp. 41–49). https://doi.org/10.1007/978-981-16-3521-2_5
- [28]Pandey, A. K. (2021). Teacher leadership during COVID-19. In *Teacher India* (pp. 10–12). ACER India.
- [29]Rosenthal, S., & Walker, Z. (2020). Experiencing Live Composite Video Lectures: Comparisons with Traditional Lectures and Common Video Lecture Methods. *International Journal for the Scholarship of Teaching and Learning*, 14(1). <https://doi.org/10.20429/ijsoetl.2020.140108>
- [30]Saminathan, V. (2021). Problems of online classes. *International Journal of Academic Research Reflectoor*, 9(January), 1–4.
- [31]Sarkodie, S. A., & Owusu, P. A. (2021). Global assessment of environment, health and economic impact of the novel coronavirus (COVID-19). *Environment, Development and Sustainability*, 23(4), 5005–5015. <https://doi.org/10.1007/s10668-020-00801-2>
- [32]Song, H., Li, F., Jia, Z., Jin, Z., & Liu, S. (2020). Using traveller-derived cases in Henan Province to quantify the spread of COVID-19 in Wuhan, China. *Nonlinear Dynamics*, 101(3), 1821–1831. <https://doi.org/10.1007/s11071-020-05859-1>
- [33]Thornton, K. (2014). Mentors as educational leaders and change agents. *International Journal of Mentoring and Coaching in Education*, 3(1), 18–31. <https://doi.org/10.1108/IJMCE-07-2013-0038>
- [34]Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., McIntyre, R. S., Choo, F. N., Tran, B., Ho, R., Sharma, V. K., & Ho, C. (2020). A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain, Behavior, and Immunity*, 87, 40–48. <https://doi.org/10.1016/j.bbi.2020.04.028>.
- [35]Haghbayan M, Khatami S S, Nasrollahi Heravi F. The Estimation of Newly Infected Cases of Covid-19 with Consideration of Governmental Action and Behavior of People in Iran. *sjmshm*. 2021; 3 (1) :1-7