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Teachers' Readiness to Implement Emergency Remote Teaching during Covid-19 Learning Disruption

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Abstract:
In response to global education disruption, teachers must adopt remote teaching methods that incorporate the information, communication, and technology (ICT). However, many teachers are inexperienced with technology, as remote learning is uncommon, particularly in primary and secondary schools. Thus, there is a pressing need to identify teachers' readiness to implement remote teaching during global crises. Specifically, this study aimed to determine their readiness in terms of attitude, subjective norm, perceived behavioral control, and ICT efficacy for implementing remote teaching during the learning disruption period. This study was a cross-sectional study conducted among 4,985 primary and secondary school teachers across five zones of Malaysia (North, South, East, and West in Western Malaysia). These participants were selected using random sampling techniques. The instrument, a survey questionnaire with a 5-Likert scale, had 26 items covering four dimensions of readiness: attitude, subjective norm, perceived behavioral control, and ICT efficacy. This instrument has been validated by three academics and demonstrated a high level of internal consistency ($\alpha = 0.81$). The findings revealed that teachers' readiness was high across all four dimensions ($M = 3.73$, $SD = 0.645$). The highest was the attitude ($M = 3.88$, $SD = 0.598$), and the lowest was the subjective norm ($M = 3.63$, $SD = 0.696$). Based on these findings, this study offers recommendations for maintaining momentum when conducting remote teaching in the face of current and future learning disruptions caused by the COVID-19 pandemic. The findings are important for policymakers and school leaders to design appropriate interventions and support effective remote teaching implementation.

Keywords: COVID-19 pandemic, emergency remote teaching, learning disruption, teacher readiness.

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教师准备在新冠肺炎学习中断期间实施紧急远程教学

摘要：
为了应对全球教育中断，教师必须采用融合信息、通信和技术(信息通信技术)的远程教学方法。然而，许多教师缺乏技术经验，因为远程学习并不常见，尤其是在中小学。因此，迫切需要确定教师在全球危机期间实施远程教学的准备情况。具体而言，本研究旨在确定他们在学习中断期间实施远程教学的态度、主观规范、感知行为控制和信息通信技术效能方面的准备情况。这项研究是在马来西亚五个地区（马来西亚西部的北部、南部、东部和西部）的4,985名中小学教师中进行的横断面研究。这些参与者是使用随机抽样技术选择的。该工具是一份采用5-
李克特量表的调查问卷，有26个项目，涵盖了准备就绪的四个维度：态度、主观规范、感知行为控制和信息通信技术效能。该工具已经过三位学者的验证，并表现出高度的内部一致性（α = 0.81）。调查结果显示，教师的准备程度在所有四个维度上都很高（米 = 3.73，标清 = 0.645）。最高的是态度（米 = 3.88，标清 = 0.598），最低的是主观规范（米 = 3.63，标清 = 0.696）。基于这些发现，本研究提出了在面对当前和未来由新冠肺炎大流行造成的学习中断时保持动力的建议。这些发现对于决策者和学校领导设计适当的干预措施和支持有效的远程教学实施非常重要。

关键词：新冠肺炎大流行、紧急远程教学、学习中断、教师准备。

1. Introduction

Unavoidable circumstances have affected 94% of the world's student population and caused global learning disruption. The current COVID-19 pandemic has resulted in the largest disruption of education in history (United Nations Educational, Scientific and Cultural Organization, 2020a). In order to adapt, nearly every country has developed a contingency plan to facilitate undisrupted learning. This has involved replacing face-to-face teaching with remote teaching and caused significant changes in conventional instructional practices (Alam & Tiwari, 2020; Sokal et al., 2020; United Nations Educational, Scientific and Cultural Organization, 2020b) following different countries' policies and implementation strategies (Tauson & Stannard, 2018; Tumwesige, 2020; United Nations Educational, Scientific and Cultural Organization, 2020a; Zhao et al., 2020). Despite the variety of implementation methods, governments' immediate measures reflect common goals: to curb the spread of the disease, provide un-interrupted learning (Alam & Tiwari, 2020; Leacock et al., 2020), and reduce the inequality affecting access to education (United Nations Educational, Scientific and Cultural Organization, 2020c).

Remote teaching is a form of distance learning, or an educational situation in which teachers and students are located in different physical environments (Doghonadze et al., 2020). Remote teaching or distance learning is not new, as both approaches have been applied in education since the 19th Century. The method has also undergone significant technological improvement (Doghonadze et al., 2020; King et al., 2001; Morgan, 2020; Phan & Dang, 2017; Toquero, 2020). During the pandemic, remote teaching has been indispensable (Doghonadze et al., 2020; Kaur, 2020). Large-scale national efforts to utilize technology in support of remote teaching are emerging and evolving quickly in response to COVID-19 (Ali, 2020).

The rapid evolution of information, communication, and technology (ICT) explains why technology integration in education continues to receive considerable attention, particularly in the wake of the COVID-19 pandemic. Utilizing a mixture of technologies, remote teaching provides immediate solutions by which most schools can ensure continuity in learning as they adapt to a distance learning system (Mukh & Tarteer, 2021). This involves using online learning platforms or technological devices such as mobile phones, tablets, radio, and television (United Nations Educational, Scientific and Cultural Organization, 2020b). Nevertheless, emergency remote teaching differs from ordinary online teaching, as educators have needed to replace face-to-face teaching with online teaching within little time to plan, design, or select the best teaching tools for students (Juhary, 2020). Online education typically requires careful planning, and it could take weeks or months to ensure that the curricula are delivered effectively (Manfuso, 2020). Moreover, as emergency remote learning has been employed as a temporary measure, the skills and strategies differ significantly from ordinary online education.

Nearly 500,000 teachers have been affected by school closures, and Malaysian teachers are no exception to this (UNICEF Malaysia, 2020). As a result of the pandemic, the country's education landscape has changed dramatically (Juhary, 2020). In response to nationwide school closures, remote teaching has been implemented abruptly and led to unavoidable challenges, particularly for teachers who are responsible for driving the implementation (Kaden, 2020; Lapada et

al., 2020; Rasmitadila et al., 2020; Vu et al., 2020). Malaysian teachers need to make an additional effort and exhibit commitment to their profession, as they were initially trained to teach in-person or face-to-face (Hibrahim, 2020). Teachers' readiness to deliver remote teaching should not be overlooked at this critical juncture, as teachers are the front-line workers that determine its implementation (König et al., 2020; United Nations Educational, Scientific and Cultural Organization, 2020b; UNICEF Malaysia, 2020; World Bank, 2020).

As the most critical intellectual resources in any school, teachers have encountered various financial, physical, and mental challenges resulting from the COVID-19 pandemic (Bouckenooghe et al., 2009). They have been tasked with implementing new teaching practices in ways that will promote student learning and maximize student safety (United Nations Educational, Scientific and Cultural Organization, 2020b). Consequently, teachers face significant challenges in adapting to online teaching, maintaining adequate communication with students, and supporting students' learning and development (Sokal et al., 2020). Therefore, implementing remote teaching more successfully and sustainably requires a better understanding of the readiness of teachers as key figures in the transition (Akarawang et al., 2015; Hung, 2016). If teachers are not ready for change, they may be more likely to develop negative attitudes and resistance (Fullan, 2007), which will limit their engagement and deprive them and their students of positive results in the long term (Fedina et al., 2017).

In the light of this, it is crucial to understand teachers' experiences of emergency remote teaching and provide specific recommendations to improve the overall quality and effectiveness of remote teaching during global crises. Therefore, this study identifies teachers' readiness to implement remote teaching during learning disruption.

2. Literature Review

2.1. Teachers' Readiness for Emergency Remote Teaching

Emergency remote teaching is arguably a new concept that has emerged due to the pandemic (Hodges et al., 2020). In response to the need for education, emergency remote teaching can be used as a temporary solution that allows all students to continue learning (Juhary, 2020). This has demanded a change in teachers' pedagogical approaches, as face-to-face teaching has transitioned to remote teaching.

In response to the pandemic, the implementation of remote teaching has been perceived as inevitable and a change to which teachers must adapt (Rasmitadila et al., 2020). Undeniably, lessons utilizing ICT appear to be the most feasible and appropriate form of remote teaching, particularly during a pandemic. Before the COVID-19 outbreak, ICT integration was emphasized within the 21st-century teaching and learning processes, as demonstrated by the Malaysian Education Blueprint 2013-2025. Significantly, the belief that students are digital natives, who tend to adapt easily to technology in education, may be inaccurate, particularly during the current learning crisis. Students may use various ICT platforms or devices for leisure and entertainment but not for formal learning (Margaryan et al., 2011; Wang et al., 2014). Additionally, primary-school students need further assistance and support from knowledgeable figures such as parents or learning support, rather than complete independence to use ICT equipment and online learning platforms (Drane et al., 2020). Therefore, integrating ICT practices during the pandemic has presented a significant challenge for both teachers and students. Abrupt and large-scale changes are most likely to be met with strong resistance and limited readiness from everyone involved (Davis, 1989).

Recent studies conducted across the globe have emphasized teachers' well-being as they deliver remote teaching during the global crisis. In countries such as Azerbaijan, Georgia, Iraq, Nigeria, and the United Kingdom, teachers were unprepared to conduct distance learning with optimal efficiency (Doghonadze et al., 2020). Contrastingly, in countries that had previously experienced several crises, such as the USA, Saudi Arabia, the Philippines, Vietnam, and Indonesia, teachers were familiar with distance learning tools and had some experience of working remotely (Alqabbani et al., 2020; Kaden, 2020; Rasmitadila et al., 2020; Vu et al., 2020). Although these studies showed substantial differences in their findings, most studies on emergency remote teaching concluded that teachers encountered enormous challenges. They found that it adds to teachers' existing workloads, as more work is needed to transition to high-quality distance education (Doghonadze et al., 2020). This condition contributes to higher levels of stress (Federkeil et al., 2020) and burnout among teachers (Sokal et al., 2020).

Earlier research has also investigated teachers' readiness for change (Armenakis & Fredenberger, 1997; Bouckenooghe et al., 2009; Hung, 2016) and distance education (Akarawang et al., 2015; Fedina et al., 2017; Moral et al., 2018; Ozturk et al., 2018; Phan & Dang, 2017; Ventayen, 2018). In Malaysia, educators in higher education institutions were ready to undertake emergency remote teaching (Juhary, 2020). However, research on the online learning experiences of teachers at primary and secondary schools is limited (Hung, 2016), particularly in the context of the pandemic (Lapada et al., 2020; Rasmitadila et al., 2020).

2.2. Theory of Planned Behaviour and Social Cognitive Theory

As a theory for explaining general individual behavior, the theory of planned behaviour (TPB) posits that behavior intentions drive individual behavior. Behavior intentions are determined by three factors: attitude, perceived behavioral control, and subjective norm.

Attitude refers to the degree to which a person experiences a favorable or unfavorable feeling about performing a particular behavior. Previous studies have found that attitude is a strong indicator of intention (Datnow, 2020; Solah, 2006). During the 1980s, teachers' attitudes were found to contribute to the successful use of computers in classrooms (Solah, 2006). Prior studies also concluded that attitude, knowledge, and skill in using computers contribute significantly to teachers' initial acceptance of computer technology and their future behavior regarding computer usage (Al-Furaydi, 2013; Pasani et al., 2020). Several studies concerning Malaysian teachers' attitudes found that numerous teachers have a positive attitude towards the use of ICT for teaching various subjects, including core and elective subjects (Ajzen, 2002; Kin et al., 2019; Trafimow et al., 2002; Venkatesh & Davis, 2000). In addition, a study about attitudes towards e-learning among EFL teachers in Saudi Arabia revealed that teachers' levels of computer literacy have a positive influence on attitudes towards e-learning (Venkatesh et al., 2003). While most studies highlight teachers' positive stance on ICT in teaching, findings on Malaysian teachers' views towards pedagogical change appear to differ (Venkatesh & Davis, 2000). Researchers proposed that the school's headteacher should ensure that teachers understand the importance of the change (Shah, 1998; Venkatesh et al., 2003).

A subjective norm is determined by normative beliefs that acknowledge the expectations of others as an important determinant of behavioral intention (Armenakis et al., 1999). Normative beliefs can be subdivided into multiple groups because individuals may have different views (Violato et al., 1989). For example, a school's headteacher may positively affect a particular system, while teachers or peers may oppose that system. Normative beliefs are typically measured when a new system is introduced or tested, for example, during the implementation of HBL as a replacement for face-to-face teaching. A subjective norm pertains to a person's perception of the social environment surrounding their behavior (Bandura, 1997). In other words, the opinions of others shape an individual's intention to use new technologies in significant ways because individuals depend on context (Shah, 1998). In their study of college students' acceptance of mobile learning, Cheon et al. (2012) found a significant relationship between subjective norms and intentions. Nonetheless, this effect was not the most substantial. This accords with Shiue's (2007) observation that the surrounding subjective environment only slightly influences the use of technology. Furthermore, a study on the factors affecting trainee teachers' intentions to use technology in Bahrain also found that subjective norms and attitudes towards technology did not significantly impact behavioral intentions to use that technology (Eksail & Afari, 2020). When exploring teachers' acceptance of e-learning technology, Yuen and Ma (2008) emphasized the importance of headteachers' using technology as a model for their colleagues, encouraging teachers to adapt.

Perceived behavioral control describes individuals' perceptions of their capability to carry out a particular behavior (Ajzen, 2002). This can be discussed in two parts: perceived ease of use and perceived usefulness (Trafimow et al., 2002). These two variables are primarily used to explain the determining factors of technology acceptance in Davis's (1989) technology acceptance model (TAM). Perceived ease of use describes the degree to which a prospective user expects the target system to require no effort. Meanwhile, perceived usefulness refers to a prospective user's subjective view that using a specific application system will increase their performance in an organizational context. Previously, these variables were found to directly affect users' intentions to use e-learning systems (Venkatesh et al., 2003; Yuen & Ma, 2008).

Lastly, self-efficacy refers to an individual's belief about their ability and motivation to perform specific tasks (Bandura, 1986, 1997). Therefore, efficacy affects teachers' readiness to change (Armenakis & Fredenberger, 1997). Furthermore, this theory contends that the belief and ability to use ICT successfully relates to decisions about the extent of its use and the degree to which an individual can learn from training (Yuen & Ma, 2008). Thus, ICT efficacy is an essential component that enhances teachers' readiness to undertake necessary change.

3. Methodology

3.1. Research Design

This was a cross-sectional study conducted among primary and secondary school teachers from five states in Malaysia. The states were selected based on their location to represent teachers in each of the five zones. Four states represent North, South, East, and West in Western Malaysia, while one state represents Eastern Malaysia. Participants were recruited using random sampling. For collecting the data, the questionnaire was shared online and distributed via WhatsApp to the chosen teachers. It was assisted by the involvement of the Education District Officers within each district. All respondents were in-service teachers during or since March 2020, when emergency measures were introduced.

Before this study, ethical approval was obtained from the Educational Planning and Research Division (EPRD). Participants were provided with information that indicated their participation was voluntary and that anonymity would be ensured throughout each research stage. The participants' confidentiality was assured, and they understood that their data were only to be used for research purposes. They were informed that they gave their consent to participate by answering the questionnaire. A total of 4,981 respondents completed the questionnaire.

3.2. Research Instrument

The researchers developed an online questionnaire comprising four elements from the abovementioned theories to collect the data (Mansor et al., 2021). The questions were adopted in the light of previous instruments (Fishbein & Azjen, 1975; Davis, 1989; Compeau & Higgins, 1995) and modified in accordance with the objectives of the present study. The questionnaire consisted of two parts. Part 1 contained demographic questions, and Part 2 encompassed 26 items from four areas: attitude, subjective norm, perceived behavioral control, and ICT efficacy. The questionnaire was constructed using a five-point Likert scale that ranged from 1 (strongly disagree) to 5 (strongly agree). Respondents were required to reflect on their recent experiences of executing remote teaching during the pandemic.

3.2.1. Validity and Reliability of the Instrument

A panel of three academics working in the field of education checked the survey's questions to ensure their validity. The reviewers confirmed that the questions were clear, readable, comprehensive, and suitable for their intended purpose. Internal consistency was assessed using Cronbach's test, which yielded good results. Cronbach's alpha test was 0.841 for the full scale of the dataset used in this research. The Cronbach Alpha coefficient was calculated for each of the four components: 0.821 (ICT efficacy); 0.805 (attitude); 0.809 (subjective norm); and 0.731 (perceived behavioural control).

3.2.2. Statistical Analysis

Cronbach's alpha and descriptive statistics were undertaken using Statistical Package for Social Sciences (SPSS) software. Hair et al. (2010) report that alpha values between 0.60 and 0.70 are satisfactory.

Table 1 shows the mean scores recorded for each part of the instrument. The interpretation process was divided into five categories, as shown in Table 1 (Tschannen-Moran & Gareis, 2004).

Table 1. The interpretation of the mean scores (Tschannen-Moran & Gareis, 2004)

Mean score	Interpretation
1.00 - 1.80	Very Low
1.81 - 2.60	Low
2.61 - 3.40	Medium
3.41 - 4.20	High
4.21 - 5.00	Very High

4. Results

4.1. General Statistics of the Study Population

A total of 4,981 teachers from five different states in Malaysia completed the online questionnaire. As indicated in Table 2, 41.9% of the participants were primary school teachers, and 58.1% were secondary school teachers. The majority of participants were female (73%), while the remaining 27% were male. Most participants (59.9%) were from rural areas, 38.7% were urban, and 1.4% were from remote areas.

Table 2. The respondents' demographic information

	Frequency	%
Gender		
Male	1347	27
Female	3638	73
School's Category		
Primary School	2089	41.9
Secondary School	2896	58.1
Teaching Experience		
1-5 years	783	15.7
6-10 years	949	19
11-15 years	1061	21.3
16-20 years	719	14,4
More than 21 years	1473	29.5
Location		
Urban	1929	38.7
Rural	2988	59.9
Remote areas	68	1.4

4.2. Level of Teachers' Readiness to Implement Remote Teaching

Table 3 shows the teachers' readiness to implement remote teaching. Overall, teachers' readiness was found to be high (M = 3.73; S.D. = .645). The highest overall mean was recorded for the attitude dimension (M = 3.88; S.D. = .598). Meanwhile, the lowest overall mean was recorded for the subjective norm dimension (M = 3.63; S.D. = .696).

Table 3. Level of teachers' readiness to implement remote teaching

Dimension	Mean	Standard Deviation	Interpretation
Attitude	3.88	0.598	High
Subjective Norm	3.63	0.696	High
Perceived Behavioural Control	3.7	0.595	High
ICT Efficacy	3.71	0.692	High
Overall	3.73	0.645	High

4.3. Level of Teachers' Readiness to Implement Remote Teaching (Attitude Dimension)

Table 4 shows the level of teachers' readiness to implement remote teaching, influenced by the attitude dimension.

Table 4. Level of teachers' readiness to implement remote teaching (attitude dimension)

No.	Item	Frequency					Description		
		SD (%)	D (%)	QA (%)	A (%)	SA (%)	Mean	S.D.	Interpretation
C13	I can conduct remote teaching according to schedules and set timetables.	6 (0.1)	93 (1.9)	671 (13.5)	1940 (38.9)	2275 (45.6)	4.28	0.773	Very High
C8	I am willing to accept comments and suggestions to improve my ability to conduct remote teaching.	8 (2.0)	129 (2.6)	971 (19.5)	2474 (49.6)	1403 (28.1)	4.03	0.770	High
C9	I can collaborate with my colleagues to implement remote teaching.	21 (0.4)	210 (4.2)	1324 (26.6)	2410 (48.3)	1020 (20.5)	3.84	0.807	High
C10	I am willing to accept guidance from my colleagues to implement remote	34 (0.7)	225 (4.5)	1480 (29.7)	2326 (46.7)	920 (18.5)	3.78	0.821	High

	teaching more effectively.								
C12	I attend in-service training, courses, webinars, and workshops that can improve my ability to use ICT.	49 (1.0)	341 (6.8)	1492 (29.9)	2259 (45.3)	844 (16.9)	3.70	0.862	High
C11	I can help my colleagues to conduct effective remote teaching.	43 (0.9)	315 (6.3)	1583 (31.8)	2340 (46.9)	704 (14.1)	3.67	0.825	High
	Overall Result						3.71	.702	High

Overall, teachers exhibited high levels of readiness for remote teaching (M = 3.71; S.D. = .702). A detailed analysis shows that more than 75% of teachers are positive about implementing remote teaching despite any challenges. Teachers felt able to follow their teaching timetable (84.5%) and always sought to improve their remote teaching skills (77.7%). However, less than 70% of teachers were ready to deliver collaborative remote teaching (68.8%), to coach (51%), and be coached by other teachers (51.9%). Finally, only 62.2% of teachers attended training to conduct remote teaching.

4.4. Level of Teachers' Readiness to Implement Remote Teaching (Subjective Norm Dimension)

Table 5 illustrates the level of teachers' readiness to implement remote teaching, as affected by the subjective norm dimension.

Table 5. Level of teachers' readiness to implement remote teaching (subjective norm dimension)

No.	Item	Frequency					Description		
		SD (%)	D (%)	QA (%)	A (%)	SA (%)	Mean	S.D.	Interpretation
C23	I receive moral support and encouragement from the school administrator as I conduct remote teaching.	29 (0.6)	95 (1.9)	1036 (20.8)	2554 (51.2)	1271 (25.5)	3.99	0.769	High
C24	The District/State Education Office organizes programs to enhance teachers' competency in remote teaching.	84 (1.7)	279 (5.6)	1610 (32.3)	2215 (44.4)	797 (16.0)	3.67	0.867	High
C25	Parents/guardians cooperate when I implement remote teaching.	107 (2.1)	484 (9.7)	1874 (37.6)	1884 (37.8)	636 (12.8)	3.49	0.91	High
C26	I receive feedback/responses from parents/guardians as I implement remote teaching.	167 (3.4)	642 (12.9)	1935 (38.8)	1685 (33.8)	552 (11.1)	3.36	0.955	Moderate
	Overall Result						3.63	.696	High

For the most part, teachers exhibited a high level of readiness (M = 3.63; S.D. = .696). Upon analysis, these results indicate that 88.8% of teachers confirmed that the District/State Education Office provides training to help enhance their competency, and 76.7% reported that they received moral support and encouragement from their school administrator in conducting remote teaching. However, only 50.6% of teachers felt that they received full cooperation from parents/guardians as they implemented remote teaching. Only 44.9% reported receiving feedback/responses from parents/guardians as they implemented remote teaching.

4.5. Level of Teachers' Readiness to Implement Remote Teaching (Perceived Behavioural Control Dimension)

Table 6 summarises teachers' level of readiness to implement remote teaching, as affected by the perceived behavioral control dimension.

Table 6. Level of teachers' readiness to implement remote teaching (perceived behavioural control dimension)

No.	Item	Frequency					Description		
		SD (%)	D (%)	QA (%)	A (%)	SA (%)	Mean	S.D.	Interpretation
C16	I encourage my students to practice self-learning by using online and offline learning materials.	29 (0.6)	95 (1.9)	1036 (20.8)	2554 (51.2)	1271 (25.5)	4.14	0.670	High
C14	I can increase my productivity by using remote teaching (e.g., diversifying students' tasks and planning T&L as appropriate).	6 (0.1)	83 (1.7)	869 (17.4)	2673 (53.6)	1354 (27.2)	4.06	0.721	High
C15	I can boost students' motivation by applying ICT to various strategies and teaching methods.	107 (2.1)	484 (9.7)	1874 (37.6)	1884 (37.8)	636 (12.8)	3.96	0.771	High
C20	I can adapt my learning content in accordance with my students' situations and the time	16 (0.3)	87 (1.7)	1247 (25.0)	2690 (54.0)	945 (19.0)	3.89	0.726	High

	available.								
C22	I can conduct formative assessments using suitable applications and software.	50 (1.0)	285 (5.7)	1681 (33.7)	2290 (45.9)	679 (13.6)	3.65	0.820	High
C19	I can communicate actively with my students when using remote teaching.	72 (1.4)	427 (8.6)	1689 (33.9)	2009 (40.3)	788 (15.8)	3.60	0.902	High
C17	When conducting remote teaching, I can increase parents'/guardians' participation (as facilitators).	109 (2.2)	497 (10.0)	1745 (35.0)	1932 (38.8)	702 (14.1)	3.53	0.928	High
C18	Using various communication mediums, I have discussions with parents/guardians to support students' learning at home.	151 (3.0)	669 (13.4)	1845 (37.0)	1736 (34.8)	584 (11.7)	3.39	0.960	Moderate
C21	I find the preparation of learning materials for remote teaching simpler than for the classroom.	50 (1.0)	285 (5.7)	1681 (33.7)	2290 (45.9)	679 (13.6)	3.10	1.121	Moderate
	Overall Result						3.70	.595	High

The findings in Table 6 indicate that teachers have high levels of readiness to implement remote teaching, as affected by the perceived behavioral control dimension (M = 3.70, S.D. = 0.595). A total of 88.8% of the teachers believed that they could enhance their productivity when conducting remote teaching and encourage their students to undertake self-learning with offline and online learning materials (76.7%). In addition, over 50% of teachers expressed that they felt able to conduct formative assessments using appropriate applications and software (59.5%), produce learning materials easily (59.5%), communicate actively with students (56.1%), and increase parents'/guardians' participation when conducting remote teaching (52.9%). However, only 46.5% reported that they had discussions with parents/guardians to support students' learning from home and were able to modify learning content according to their students' circumstances and schedules (44.9 %).

4.6. Level of Teachers' Readiness to Implement Remote Teaching (ICT Efficacy Dimension)

Table 7 summarizes teachers' readiness to implement remote teaching, as affected by the ICT efficacy dimension.

Table 7. Level of teachers' readiness to implement remote teaching (ICT efficacy dimension)

No.	**Item**	**Frequency**					**Description**		
		SD (%)	**D (%)**	**QA (%)**	**A (%)**	**SA (%)**	**Mean**	**S.D.**	**Interpretation**
C5	I can upload and download T&L materials in the form of video, audio, slides, notes, and exercises from various sources.	29 (0.6)	95 (1.9)	1036 (20.8)	2554 (51.2)	1271 (25.5)	4.05	0.816	High
C2	I can utilize various online teaching methods (e.g., using a learning platform such as EduWebTV/Delima, purchasing exercises via e-mail or WhatsApp/Telegram applications).	62 (1.2)	255 (5.1)	1008 (20.2)	2146 (43.0)	1514 (30.4)	3.96	0.906	High
C3	I disseminate learning content using various social media platforms (e.g., Facebook, Instagram, Cikgoo Tube, and Eduweb TV).	44 (0.9)	208 (4.2)	1177 (23.6)	2313 (46.4)	1243 (24.9)	3.90	0.850	High
C4	I can create various online tasks using gamification, video, audio clips, eBooks, recordings of online tasks, etc.	130 (2.6)	438 (8.8)	1554 (31.2)	2076 (41.6)	787 (15.8)	3.59	0.943	High
C7	I can employ different remote teaching strategies using ICT (e.g., teacher-centered teaching, flipped learning, inquiry-based learning, mastery learning, problem-solving, blended learning, and self-directed learning).	78 (1.6)	349 (7.0)	1754 (35.2)	2155 (43.2)	649 (13.0)	3.59	0.858	High
C1	I can conduct remote teaching via live stream using learning platforms such as Microsoft Teams, Skype, and Google Meet.	280 (5.6)	708 (14.2)	1425 (28.6)	1529 (30.7)	1043 (20.9)	3.47	1.135	High
C6	I can communicate confidently using online audio and visual platforms (e.g., Google Hangouts and Google Talk).	191 (3.8)	698 (14.0)	1822 (36.5)	1609 (32.3)	665 (13.3)	3.37	1.005	Moderate
	Overall Result						3.71	.692	High

The findings in Table 7 indicate that teachers have high levels of readiness to implement remote teaching, as affected by the ICT efficacy dimension (M = 3.71, S.D. = 0.692). More specifically, the data suggest that teachers could upload and download T&L materials (76.7%), integrate diverse remote teaching methods (73.4%), disseminate learning content using several social media platforms (71.3%), create online tasks (57.4%), deploy teaching strategies (56.2%), and conduct remote teaching using a live stream (51.6%). Contrastingly, only 45.6% of teachers felt able to communicate confidently using online audio and visual platforms.

5. Discussion

This study has examined the levels of readiness to implement remote teaching among primary and secondary school teachers during the COVID-19 pandemic. This has been assessed in relation to four elements: attitude, subjective norm, perceived behavior control, and ICT efficacy. Overall, the findings have shown that teachers' readiness was high across all four factors, demonstrating that teachers can transition from face-to-face learning to remote teaching in response to learning disruption. This differs from the research of Rafferty and Simons (2006), who claim that large-scale change is likely to be met with strong resistance and limited readiness. However, these findings are similar to existing research that has found that teachers from neighboring countries, such as Indonesia, Vietnam, and the Philippines, are equally ready to adapt despite the current challenges (Alqabbani et al., 2020; Kaden, 2020; Rasmitadila et al., 2020; Vu et al., 2020).

5.1. Attitude

In comparison with the remaining three dimensions, the attitude was found to have the highest mean score. This indicates that teachers' attitudes contribute to their readiness and are crucial to implementing change (Akarawang et al., 2015). Interestingly, within the attitude dimension, teachers' lowest mean score concerned their ability to support their peers to cope with pedagogical change. This may be affected by the additional work (Federkeil et al., 2020) that they contend with while adjusting, as this leaves them little time to support their peers when they are in need. Nevertheless, while this element yielded the lowest mean, it remains positive and demonstrates that teachers value peer support. Given the demand currently placed on teachers, peer support may gradually occur as they continue to adjust.

5.2. Subjective Norm

The subjective norm dimension was found to yield the lowest mean, indicating that teachers felt the support provided by their environment and that its impact on their readiness to implement remote learning was comparatively low. More specifically, parental support in delivering remote learning was particularly low compared with that provided by the headteacher or district officer. Just as teachers struggle to motivate their students, parents struggle to find the time to help their children (Tulsa SEED Study, 2020). As a result of travel restrictions, the effectiveness of remote learning partly depends on parents, as schools continually seek feedback relating to the educational needs of the students and their emotional well-being (Drane et al., 2020). Without parents' cooperation, teachers' motivation to adapt is affected, which alters children's learning experiences. Therefore, school administrators should facilitate appropriate planning for the implementation of remote learning and consider every factor that can affect students' learning during this global crisis.

5.3. Perceived Behavioral Control

Overall, the perceived behavioral control dimension was high in this study. This dimension describes the role of technology in teachers' implementation of remote teaching. Despite the unique circumstances, participants were optimistic about using ICT to implement remote teaching. This result corresponded with a previous study involving another higher education institution in Malaysia. It also found that educators were willing to use technology to implement remote teaching, notwithstanding numerous constraints (Juhary, 2020).

5.4. ICT Efficacy

In this study, the level of ICT efficacy was high. This suggests that teachers felt able to use ICT to implement remote teaching. Upon further analysis, the data showed that teachers' experience with commonly used ICT skills returned the highest average, whereas teachers' use of more complex ICT skills recorded the lowest score. This corresponded with the work of Juhary (2020) and Manfuso (2020), who explain the differences in teachers' use and application of ICT skills, particularly during the current learning crisis.

6. Conclusion

In short, the findings of this study exemplified that teachers' readiness was at a high level across all four dimensions (M = 3.73, SD = 0.645). The highest was the attitude (M = 3.88, SD = 0.598), and the lowest was the subjective norm (M = 3.63, SD = 0.696). Detailed analysis of the attitude dimension revealed that the majority of them are positive about implementing remote teaching (75%), able to follow their teaching timetable (84.5%), and always tried to improve their teaching skills (77.7%). However, they faced challenges in delivering collaborative teaching, coaching others, and being coached by other teachers.

Most of the findings on the subjective norm dimension confirmed that the District/State Education Office provides training to help enhance their competency (88.8%), and they received moral support and encouragement from their school administrators in

conducting remote teaching (76.7%). However, for receiving full cooperation and feedback from parents on their teaching, the agreement percentage was lower. Regarding the perceived behavior domain, the teachers believed that they could enhance their productivity (88.8%). They encouraged their students to undertake self-learning with offline and online learning materials (76.7%). However, the ability to conduct a formative assessment, produce learning materials, communicate effectively with students, and increase parents' involvement in remote learning were challenging to them. On the other hand, the findings of the ICT efficacy domain revealed that the teachers were able to upload and download teaching materials (76.7%), utilize various teaching methods (73.4%), and disseminate learning content via social media platforms (71.3%). Nevertheless, less than 60% of them agreed that they could create various online tasks, deploy different teaching strategies, conduct teaching via live stream, and communicate confidently using online audio and visual platforms.

The current study's findings extend the previous research on remote teaching implementation. Even though the current study was limited to the Malaysian context, it was discovered that attitude was an influential factor in teacher readiness for implementing remote teaching. Akarawang et al. (2015) agreed that attitudes play an important role in teacher readiness and, as a result, contribute to the effective implementation of desired changes. Furthermore, it was not surprising to learn that the low support from the parents in remote learning has affected the teaching outcomes. According to the Tulsa SEED Study (2020), parents struggled to split their time for their children's education amid the disturbance. This has led to a lack of collaboration in the remote teaching and learning process.

Interestingly, the overall mean for perceived behavior control and ICT efficacy domain was high. This provides important information on the role of technology in teachers' implementation of remote teaching. Even though remote teaching was uncommon, teachers were optimistic and capable of incorporating ICT into the teaching and learning process. This is consistent with Juhary's (2020) study, which discovered that educators in the Malaysian higher education institutions were positive about using ICT during the learning disruption period.

Much can be learned from the findings of this research. Even though all readiness domains were at a high level, a closer identification exemplified that several issues needed to be addressed appropriately. In order to improve teachers' attitudes, support and encouragement from the school or the ministry should be properly provided to guide them in enhancing collaboration in conducting remote learning. In addition, coaching or training is highly needed to help teachers develop a positive attitude towards integrating ICT into remote teaching. Aside from that, improving teachers' perceived behavioral control is critical. Both variables, perceived ease of use and perceived usefulness, should be emphasized in training or coaching. According to Ajzen (2002), both variables are critical in improving users' subjective views of using technology, which will increase productivity. As a result, acquiring relevant technological tools and exposure to in-house training or outside school courses can help teachers improve their perceived behavioral control. This, in turn, will improve their ICT skills, making it easier for them to teach lessons using different technological tools.

In addition to training, the relevant parties, such as the school and the District/State Education Office, should find common ground to increase parental involvement in their children's learning. Despite parents' hectic schedules (Juhary, 2020), they should be able to devote time to supporting teachers by providing extended learning opportunities outside of the classroom. Teachers can also be helped by providing feedback on their teaching and learning. This information is critical for teachers to plan appropriate measures to improve teaching delivery.

7. Limitations and Further Study

The outcomes of this study have contributed to the next step in improving the implementation of remote teaching. Four relevant variables developed from the theory of planned behaviour and the social cognitive theory were used to quantify readiness. Each of the four dimensions has a significant role in understanding the behavior of integrating ICT for distance education. Furthermore, as stated in the preceding section, the findings indicate that several concerns require a quick response. Thus, this information can be used to design appropriate measures for enhancing remote teaching.

However, these results should be interpreted with caution. Since the sampling was limited to primary and secondary schools in five Malaysian zones (North, South, East, and West in Western Malaysia), the results cannot be applied to other educational institutions. It is advised that future studies investigate the readiness of teachers to integrate emergency remote teaching at other institutions, such as kindergartens and universities. These institutions were also severely impacted by the school closures during the pandemics. On the other hand, since this study showed that teachers did not obtain enough help from parents and other important people, future research should consider this issue to learn more about it.

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Authors' Contributions

Conceptualization - Mansor, A.N. and Zabarani, N.H.; Writing, review, and editing - Mansor, A.N., Zabarani, N.H., Jamaludin, K.A., and Mansor, A.Z.;

Data collection - Zabarani, N.H., Jamaludin, K.A., Ismail, A.A., Abang Deli, A.A., and Zakaria, A.F.; Data analysis - Zabarani, N.H. and Mansor, A.N.

References

[1] AJZEN, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology*, 32(4), 665-683. https://doi.org/10.1111/j.1559-1816.2002.tb00236.x

[2] AKARAWANG, C., KIDRAKRAN, P., & NUANGCHALERM, P. (2015). Enhancing ICT Competency for Teachers in the Thailand Basic Education System. *International Education Studies*, 8(6), 1-8. https://doi.org/https://doi.org/10.5539/ies.v8n6p1

[3] ALAM, A., & TIWARI, P. (2020). *Putting the 'learning' back in remote learning.* Retrieved from https://www.unicef.org/globalinsight/sites/unicef.org.globalinsight/files/2020-06/UNICEF-Global-Insight-remote-learning-issue-brief-2020.pdf

[4] AL-FURAYDI, A.A. (2013). Measuring E-learning readiness among EFL teachers in intermediate public schools in Saudi Arabia. *English Language Teaching*, 6(7), 110–121. https://doi.org/10.5539/elt.v6n7p110

[5] ALI, W. (2020). Online and Remote Learning in Higher Education Institutes: A Necessity in light of COVID-19 Pandemic. *Higher Education Studies*, 10(3), 16-25. https://doi.org/10.5539/hes.v10n3p16

[6] ALQABBANI, S., ALMUWAIS, A., BENAJIBA, N., & ALMOAYAD, F. (2020). Readiness towards emergency shifting to remote learning during COVID-19 pandemic among university instructors. *E-Learning and Digital Media*, 18(5), 460-479. https://doi.org/10.1177/2042753020981651

[7] ARMENAKIS, A.A., & FREDENBERGER, W.B. (1997). Organizational change readiness practices of business turnaround change agents. *Knowledge and Process Management*, 4(3), 143–152. https://doi.org/10.1002/(sici)1099-1441(199709)4:3<143::aid-kpm93>3.0.co;2-7

[8] ARMENAKIS, A.A., HARRIS, S.G., & FEILD, H.S. (1999). Making change permanent: A model for institutionalizing change interventions. In: PASMORE, W.A., & WOODMAN, R.W. (eds.) *Research in organizational change and development*, Vol. 12. New York: JAI Press, pp. 97-128.

[9] BANDURA, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, New Jersey: Prentice Hall.

[10] BANDURA, A. (1997). *Self-efficacy: The exercise of control*. New York: W.H. Freeman.

[11] BOUCKENOOGHE, D., DEVOS, G., & VAN DEN BROECK, H. (2009). Organizational change questionnaire-climate of change, processes, and readiness: Development of a new instrument. *The Journal of Psychology: Interdisciplinary and Applied*, 143(6), 559-599. https://doi.org/10.1080/00223980903218216

[12] CHEON, J., LEE, S., CROOKS, S.M., & SONG, J. (2012). An investigation of mobile learning readiness in higher education based on the theory of planned behavior. *Computers and Education*, 59(3), 1054–1064. https://doi.org/10.1016/j.compedu.2012.04.015

[13] COMPEAU, D., & HIGGINS, C.A. (1995). Computer self-efficacy: development of a measure and initial test. *MIS Quarterly*, 19(2), 189-211. https://doi.org/10.2307/249688

[14] DATNOW, A. (2020). The role of teachers in educational reform: A 20-year perspective. *Journal of Educational Change*, 21(1), 109–113. https://doi.org/10.1007/s10833-020-09372-5

[15] DAVIS, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–339. https://doi.org/10.2307/249008

[16] DOGHONADZE, N., ALIYEV, A., HALAWACHY, H., KNODEL, L., & ADEDOYIN, A.S. (2020). The Degree of Readiness to Total Distance Learning in the Face of COVID-19 - Teachers' View (Case of Azerbaijan, Georgia, Iraq, Nigeria, UK and Ukraine). *Journal of Education in Black Sea Region*, 5(2), 2-41. https://doi.org/10.31578/jebs.v5i2.197

[17] DRANE, C., VERNON, L., & SHEA, S.O. (2020). *The Impact of 'Learning at Home' on the Educational Outcomes of Vulnerable Children in Australia during the COVID-19 Pandemic.* The National Centre for Student Equity in Higher Education, Curtin University. Retrieved from https://www.ncsehe.edu.au/publications/learning-at-home-educational-outcomes-vulnerable-children-australia-covid-19/

[18] EKSAIL, F.A.A., & AFARI, E. (2020). Factors affecting trainee teachers' intention to use technology: A structural equation modeling approach. *Education and Information Technologies*, 25, 2681–2697. https://doi.org/10.1007/s10639-019-10086-2

[19] FEDERKEIL, L., HEINSCHKE, F., & KLAPPROTH, F. (2020). Teachers' experiences of stress and their coping strategies during COVID-19 induced distance teaching. *Journal of Pedagogical Research*, 4(4), 444-452. https://doi.org/10.33902/jpr.2020062805

[20] FEDINA, N.V., BURMYKINA, I.V., ZVEZDA, L.M., PIKALOVA, O.S., SKUDNEV, D.M., & VORONIN, I.V. (2017). Study of educators' and parents' readiness to implement distance learning technologies in preschool education in Russia. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(12), 8415–8428. https://doi.org/10.12973/ejmste/80802

[21] FISHBEIN, M., & AZJEN, I. (1975). *Belief, attitude, intention and behaviour: An introduction to*

theory and research. Reading, Massachusetts: Addison-Wesley.

[22] FULLAN, M. (2007). Change Theory as a Force for School Improvement. In: BURGER, J.M., WEBBER, C.F., & KLINCK, P. (eds.) *Intelligent Leadership. Studies in Educational Leadership,* Vol. 6. Dordrecht: Springer, pp. 27–39. https://doi.org/10.1007/978-1-4020-6022-9_3

[23] HAIR, J.F., BLACK, W.C., BABIN, B.J., & ANDERSON, R.E. (2010). *Multivariate data analysis.* Upper Saddle River, New Jersey: Prentice Hall.

[24] HIBRAHIM, M.A. (2020). *Pensyarah belum sedia mengajar online.* Sinar Harian. Retrieved from https://www.www.sinarharian.com.my/article/110517/BERITA/Nasional/Pensyarah-belum-sedia-mengajar-secara-online

[25] HODGES, C., MOORE, S., LOCKEE, B., TRUST, T., & BOND, A. (2020). The difference between emergency remote teaching and online learning. *EDUCAUSE Review*. Retrieved from https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

[26] HUNG, M.L. (2016). Teacher readiness for online learning: Scale development and teacher perceptions. *Computers and Education,* 94, 120–133. https://doi.org/10.1016/j.compedu.2015.11.012

[27] JUHARY, J. (2020). Emergency Remote Teaching during COVID-19 Pandemic: Roles of Educators in Malaysia. In: SHOHEL, M.M.C. (ed.) *E-Learning and Digital Education in the Twenty-First Century*. London: IntechOpen. https://doi.org/10.5772/intechopen.95071

[28] KADEN, U. (2020). Covid-19 school closure-related changes to the professional life of a k–12 teacher. *Education Sciences,* 10(6), 165. https://doi.org/10.3390/educsci10060165

[29] KAUR, G. (2020). Digital Life: Boon or bane in teaching sector on COVID-19. *CLIO: An Annual Interdisciplinary Journal of History,* 6(6), 416–427.

[30] KIN, T.M., KAREEM, O.A., & GHOURI, A.M. (2019). Competency of School Principals in Managing Change in Malaysian Secondary Schools: Teachers' Perspective. *International Journal of Academic Research in Business and Social Sciences,* 9(6), 285–304. https://doi.org/10.6007/ijarbss/v9-i6/5947

[31] KING, F.B., YOUNG, M.F., DRIVERE-RICHMOND, K., & SCHRADER, P.G. (2001). Defining Distance Learning and Distance Education. *AACE Journal,* 9(1), 1–14.

[32] KÖNIG, J., JÄGER-BIELA, D.J., & GLUTSCH, N. (2020). Adapting to online teaching during COVID-19 school closure: teacher education and teacher competence effects among early career teachers in Germany. *European Journal of Teacher Education,* 43(4), 608–622. https://doi.org/10.1080/02619768.2020.1809650

[33] LAPADA, A.A., MIGUEL, F.F., ROBLEDO, D.A.R., & ALAM, Z.F. (2020). Teachers' Covid-19 Awareness, Distance Learning Education Experiences and Perceptions towards Institutional Readiness and Challenges. *International Journal of Learning, Teaching and Educational Research,* 19(6), 127–144. https://doi.org/10.26803/ijlter.19.6.8

[34] LEACOCK, C.J., WARRICAN, S.J., & WARRICAN, S.J. (2020). Helping teachers to respond to COVID-19 in the Eastern Caribbean: issues of readiness, equity and care. *Journal of Education for Teaching,* 46(4), 576-585. https://doi.org/10.1080/02607476.2020.1803733

[35] MANFUSO, L. (2020). *From emergency remote teaching to rigorous online learning.* Retrieved from https://edtechmagazine.com/higher/article/2020/05/emergency-remote-teaching-rigorous-online-learning-perfcon

[36] MANSOR, A.N., ZABARANI, N.H., JAMALUDIN, K.A., MOHD NOR, M.Y., ALIAS, B.S., & MANSOR, A.Z. (2021). Home-Based Learning (HBL) Teacher Readiness Scale: Instrument Development and Demographic Analysis. *Sustainability,* 13(4), 2228. https://doi.org/10.3390/su13042228

[37] MARGARYAN, A., LITTLEJOHN, A., & VOJT, G. (2011). Are digital natives a myth or reality? University students' use of digital technologies. *Computers and Education,* 56(2), 429–440. https://doi.org/10.1016/j.compedu.2010.09.004

[38] MORAL, C., MARTÍN-ROMERA, A., MARTÍNEZ-VALDIVIA, E., & OLMO-EXTREMERA, M. (2018). Successful secondary school principalship in disadvantaged contexts from a leadership for learning perspective. *School Leadership and Management,* 38(1), 32–52. https://doi.org/10.1080/13632434.2017.1358161

[39] MORGAN, H. (2020). Best Practices for Implementing Remote Learning during a Pandemic. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas,* 93(3), 135-141. https://doi.org/10.1080/00098655.2020.1751480

[40] MUKH, Y.N.A., & TARTEER, S. (2021). The Role of ICT Centers in the Palestinian Universities during the Covid-19 Pandemic. *Journal of Southwest Jiaotong University,* 56(4), 457-469. https://doi.org/10.35741/issn.0258-2724.56.4.32

[41] OZTURK, D.S., OZTURK, F., & OZEN, R. (2018). The relationship between prospective teachers' readiness and satisfaction about web-based distance education. *Turkish Online Journal of Distance Education,* 19(1), 147–162. https://doi.org/https://doi.org/10.17718/tojde.382791

[42] PASANI, C.F., AMELIA, R., & HASSAN, Z. (2020). Covid-19 impact in Indonesia's education sector: Challenges and strategy. *Journal of Advanced Research in Dynamical and Control Systems,* 12(7-Special Issue), 1722-1731. https://doi.org/10.5373/JARDCS/V12SP7/20202281

[43] PHAN, T.T.N., & DANG, L.T.T. (2017). Teacher Readiness for Online Teaching: A Critical Review.

International Journal on Open and Distance e-Learning, 3(1), 1–16. Retrieved from https://ijodel.com/wp-content/uploads/2017/12/001_Phan_Dang.pdf

[44] RAFFERTY, A.E., & SIMONS, R.H. (2006). An examination of the antecedents of readiness for fine-tuning and corporate transformation changes. *Journal of Business and Psychology,* 20, 325–350. https://doi.org/10.1007/S10869-005-9013-2

[45] RASMITADILA, R., ALIYYAH, R.R., RACHMADTULLAH, R., SAMSUDIN, A., SYAODIH, E., NURTANTO, M., & TAMBUNAN, A.R.S. (2020). The Perceptions of Primary School Teachers of Online Learning during the COVID-19 Pandemic Period: A Case Study in Indonesia. *Journal of Ethnic and Cultural Studies,* 7(2), 90–109. https://doi.org/10.29333/ejecs/388

[46] SHAH, P. (1998). Who are employees' social referents? Using a network perspective to determine referent others. *The Academy of Management Journal,* 41(3), 249–268. https://doi.org/10.5465/256906

[47] SHIUE, Y. (2007). Investigating the sources of teachers' instructional technology use through the decomposed theory of planned behavior. *Journal of Educational Computing Research,* 36(4), 425–453. https://doi.org/10.2190/A407-22RR-50X6-2830

[48] SOKAL, L.J., TRUDEL, L.G.E., & BABB, J.C. (2020). Supporting Teachers in Times of Change: The Job Demands- Resources Model and Teacher Burnout during the COVID-19 Pandemic. *International Journal of Contemporary Education,* 3(2), 67-74. https://doi.org/10.11114/ijce.v3i2.4931

[49] SOLAH, S.M. (2006). *Perception and Readiness Level of Information and Communication Technology (ICT) Application among Malay Language Teacher in Urban and Rural Schools.* Master's thesis. Bangi: Universiti Kebangsaan Malaysia.

[50] TAUSON, M., & STANNARD, L. (2018). *EdTech for Learning in Emergencies and Displaced Settings: A Rigorous Review and Narrative Synthesis.* Save the Children. Retrieved from https://resourcecentre.savethechildren.net/document/edtech-learning-emergencies-and-displaced-settings-rigorous-review-and-narrative-synthesis/

[51] TOQUERO, C.M. (2020). Challenges and opportunities for higher education amid the COVID-19 pandemic: The Philippine context. *Pedagogical Research,* 5(4), em0063. https://doi.org/10.29333/pr/7947

[52] TRAFIMOW, D., SHEERAN, P., CONNER, M., & FINLAY, K.A. (2002). Evidence that perceived behavioural control is a multidimensional construct: Perceived control and perceived difficulty. *British Journal of Social Psychology,* 41(1), 101–121. https://doi.org/10.1348/014466602165081

[53] TSCHANNEN-MORAN, M., & GAREIS, C. (2004). Principals' sense of efficacy: Assessing a promising construct. *Journal of Educational Administration,* 42(5), 573-585. https://doi.org/10.1108/09578230410554070

[54] TULSA SEED STUDY. (2020). *Parents, Teachers, and Distance Learning during the COVID-19 Pandemic: A Snapshot from Tulsa, OK.* Retrieved from https://medium.com/@TulsaSEED/parents-teachers-and-distance-learning-during-the-covid-19-pandemic-a-snapshot-from-tulsa-ok-5b5fdb54ea18

[55] TUMWESIGE, J. (2020). *COVID-19 Educational Disruption and Response: Rethinking e-Learning in Uganda.* Retrieved from https://www.kas.de/documents/280229/8800435/COVID-19+Educational+Disruption+and+Response+-+Rethinking+e-Learning+in+Uganda.pdf/6573f7b3-b885-b0b3-8792-04aa4c9e14b7?t=1589283963112

[56] UNICEF MALAYSIA. (2020). *Covid-19 a Child Rights Crisis.* Retrieved from https://www.unicef.org/malaysia/media/1361/file/COVID_Newsletter_1.pdf

[57] UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION. (2020a). *Distance learning strategies in response to COVID-19 school closures.* Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000373305

[58] UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION. (2020b). *Supporting Teachers to Maintain Continuity of Learning During School Closures.* Retrieved from https://en.unesco.org/sites/default/files/covid-19-ed_webinar2-supporting_teachers_to_maintain_continuity_of_learning_during_school_closures-report-en.pdf

[59] UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION. (2020c). *UNESCO COVID-19 Education Response: Education Sector Issue Notes*, Issue Note N° 7.1. Retrieved from file:///C:/Users/%D0%9F%D0%BE%D0%BB%D1%8C%D0%B7%D0%BE%D0%B2%D0%B0%D1%82%D0%B5%D0%BB%D1%8C/Downloads/COVID-19%20Education%20Issue%20Note%207.1%20School%20reopening.pdf

[60] VENKATESH, V., & DAVIS, F.D. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science,* 46(2), 186–204. https://doi.org/10.1287/MNSC.46.2.186.11926

[61] VENKATESH, V., MORRIS, M.G., DAVIS, G.B., & DAVIS, F.D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly,* 27(3), 425–478. https://doi.org/10.2307/30036540

[62] VENTAYEN, R.J. (2018). Teachers' Readiness in

Online Teaching Environment: A Case of Department of Education Teachers. *Journal of Education, Management and Social Sciences*, 2(1), 94-106. Retrieved from https://psurj.org/wp-content/uploads/2019/05/JEMSS-2019-013.pdf

[63] VIOLATO, C., MARINIZ, A., & HUNTER, W. (1989). A confirmatory factor analysis of a four-factor model of attitudes toward computers: A study of preservice teachers. *Journal of Research on Computers in Education*, 21, 199–213. https://doi.org/10.1080/08886504.1989.10781915

[64] VU, C.T., HOANG, A.D., THAN, V.Q., NGUYEN, M.T., DINH, V.H., LE, Q.A.T., & NGUYEN, Y.C. (2020). Dataset of Vietnamese teachers' perspectives and perceived support during the COVID-19 pandemic. *Data in Brief*, 31, 105788. https://doi.org/10.1016/j.dib.2020.105788

[65] WANG, S.-K., HSU, H.-Y., CAMPBELL, T., COSTER, D., & LONGHURST, M. (2014). An investigation of middle school science teachers and students use of technology inside and outside of classrooms: Considering whether digital natives are more technology savvy than their teachers. *Educational Technology Research and Development*, 62(6), 637–662. https://doi.org/10.1007/s11423-014- 9355-4

[66] WORLD BANK. (2020). *Guidance Note on Education Systems' Response to COVID19.* Retrieved from https://documents1.worldbank.org/curated/en/450881585235950757/Guidance-Note-on-Education-Systems-Response-to-COVID19.pdf

[67] YUEN, A.H.K., & MA, W.W.K. (2008). Exploring teacher acceptance of e-learning technology. *Asia-Pacific Journal of Teacher Education*, 36(3), 229–243. https://doi.org/10.1080/13598660802232779

[68] ZHAO, J., XIAO, H., LI, Y., WEN, D., XU, P., FU, Y., & ZHAO, G. (2020). *Experience of Massive Distance Online Education for Medical Colleges and Universities in China to Counter the COVID-19 Pandemic*. https://doi.org/10.21203/rs.3.rs-29678/v1

参考文:

[1] AJZEN, I. (2002)。感知行为控制、自我效能、控制点和计划行为理论。应用社会心理学杂志，32（4），665-683。https://doi.org/10.1111/j.1559-1816.2002.tb00236.x

[2] AKARAWANG, C.、KIDRAKRAN, P. 和 NUANGCHALERM, P. (2015)。提高泰国基础教育系统教师的 ICT 能力。国际教育研究，8（6），1-8。https://doi.org/https://doi.org/10.5539/ies.v8n6p1

[3] ALAM, A. 和 TIWARI, P. (2020)。将"学习"放回远程学习中。取自 https://www.unicef.org/globalinsight/sites/unicef.org.globalinsight/files/2020-06/UNICEF-Global-Insight-remote-learning-issue-brief-2020.pdf

[4] AL-FURAYDI, A.A.（2013）。测量沙特阿拉伯中等公立学校英语教师的电子学习准备情况。英语教学，6（7），110-121。https://doi.org/10.5539/elt.v6n7p110

[5]阿里，W.（2020年）。高等教育机构的在线和远程学习：鉴于新冠肺炎大流行的必要性。高等教育研究，10（3），16-25。https://doi.org/10.5539/hes.v10n3p16

[6] ALQABBANI, S.、ALMUWAIS, A.、BENAJIBA, N. 和 ALMOAYAD, F. (2020)。大学教师在新冠肺炎大流行期间准备紧急转向远程学习。电子学习和数字媒体，18（5），460-479。https://doi.org/10.1177/2042753020981651

[7] ARMENAKIS, A.A. 和 FREDENBERGER, W.B. (1997)。业务转型变革推动者的组织变革准备实践。知识和流程管理，4（3），143-152。https://doi.org/10.1002/(sici)1099-1441(199709)4:3<143::aid-kpm93>3.0.co;2-7

[8] ARMENAKIS, A.A., HARRIS, S.G. 和 FEILD, H.S. (1999)。使变革永久化：将变革干预制度化的模型。在：PASMORE, W.A., & WOODMAN, R.W. (编辑。) 组织变革与发展研究, 卷。12. 纽约：贾伊出版社，第 97-128 页。

[9] 班杜拉，A. (1986)。思想和行动的社会基础：一种社会认知理论。新泽西州恩格尔伍德悬崖：普伦蒂斯霍尔。

[10]班杜拉，A.（1997年）。自我效能：控制的行使。纽约：W.H.弗里曼。

[11] BUCKENOOGHE, D., DEVOS, G., & VAN DEN BROECK, H. (2009)。组织变革问卷——变革、流程和准备的气候：新工具的开发。心理学杂志：跨学科和应用，143（6），559-599。https://doi.org/10.1080/00223980903218216

[12] CHEON, J., LEE, S., CROOKS, S.M., & SONG, J. (2012)。基于计划行为理论的高等教育移动学习准备调查计算机与教育，59（3），1054–1064。https://doi.org/10.1016/j.compedu.2012.04.015

[13] COMPEAU, D., & HIGGINS, C.A.（1995年）。计算机自我效能：开发测量和初始测试。管理信息系统季刊，19(2)，189-211。https://doi.org/10.2307/249688

[14] DATNOW, A. (2020)。教师在教育改革中的作用：一个20年的视角。教育变革杂志，21（1），109–113。https://doi.org/10.1007/s10833-020-09372-5

[15]戴维斯，F.D.（1989年）。感知有用性、感知易用性和用户对信息技术的接受度。管理信息系统季刊，13(3)，319–

339。https://doi.org/10.2307/249008

[16] DOGHONADZE, N., ALIYEV, A., HALAWACHY, H., KNODEL, L., & ADEDOYIN, A.S.（2020年）。面对新冠肺炎对全面远程学习的准备程度——
教师的观点（阿塞拜疆、格鲁吉亚、伊拉克、尼日利亚、英国和乌克兰的案例）。黑海地区教育杂志，5（2），2-
41。https://doi.org/10.31578/jebs.v5i2.197

[17] DRANE, C., VERNON, L., & SHEA, S.O.（2020年）。新冠肺炎大流行期间"在家学习"对澳大利亚弱势儿童教育成果的影响。科廷大学国家高等教育学生平等中心。取自 https://www.ncsehe.edu.au/publications/learning-at-home-educational-outcomes-vulnerable-children-australia-covid-19/

[18] EKSAIL, F.A.A. 和 AFARI, E.(2020)。影响实习教师使用技术意愿的因素：一种结构方程建模方法。教育和信息技术，25, 2681–2697。https://doi.org/10.1007/s10639-019-10086-2

[19] FEDERKEIL, L.、HEINSCHKE, F. 和 KLAPROTH, F.(2020)。教师在新冠肺炎诱导远程教学期间的压力经历及其应对策略。教学研究杂志，4（4），444-452。https://doi.org/10.33902/jpr.2020062805

[20] FEDINA, N.V., BURMYKINA, I.V., ZVEZDA, L.M., PIKALOVA, O.S., SKUDNEV, D.M., & VORONIN,
I.V.（2017）。俄罗斯教育工作者和家长在学前教育中实施远程学习技术的准备情况研究。欧亚数学、科学与技术教育杂志，13（12），8415-8428。https://doi.org/10.12973/ejmste/80802

[21] FISHBEIN, M., & AZJEN, I.(1975)。信念、态度、意图和行为：理论和研究导论。马萨诸塞州雷丁：艾迪生-卫斯理。

[22]富兰，M.（2007年）。变革理论作为学校改进的力量。在：BURGER, J.M., WEBBER, C.F., & KLINCK, P.(编辑。)智能领导。教育领导研究，卷。6.
多德雷赫特：施普林格，第27-39页。https://doi.org/10.1007/978-1-4020-6022-9_3

[23] HAIR, J.F., BLACK, W.C., BABIN, B.J. 和 ANDERSON,
R.E.（2010）。多变量数据分析。新泽西州上马鞍河：普伦蒂斯大厅。

[24]HIBRAHIM，文学硕士（2020年）。讲师还没有准备好教书在线。辛纳哈里安。取自 https://www.www.sinarharian.com.my/article/110517/BERITA/Nasional/Pensyarah-belum-sedia-mengajar-secara-online

[25] HODGES, C., MOORE, S., LOCKEE, B., TRUST, T., & BOND, A.(2020)。紧急远程教学与在线学习的区别。教育事业评论。取自 https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

[26]洪，M.L.（2016年）。教师在线学习准备：规模发展和教师认知。计算机与教育，94，120-133。https://doi.org/10.1016/j.compedu.2015.11.012

[27]朱哈里，J.（2020年）。新冠肺炎大流行期间的紧急远程教学：马来西亚教育工作者的角色。在：SHOHEL，M.M.C.（编）二十一世纪的电子学习和数字教育。伦敦：IntechOpen。https://doi.org/10.5772/intechopen.95071

[28]卡登，美国（2020年）。新冠肺炎学校停课对k-12教师职业生涯的影响。教育科学，10(6)，165。https://doi.org/10.3390/educsci10060165

[29]考尔，G.（2020年）。数字生活：新冠肺炎教学领域的福音或祸根。克里奥：年度跨学科历史杂志，6（6），416-427。

[30] KIN, T.M., KAREEM, O.A. 和 GHOURI, A.M.（2019）。马来西亚中学校长管理变革的能力：教师的观点。国际商业和社会科学学术研究杂志，9（6），285–304。https://doi.org/10.6007/ijarbss/v9-i6/5947

[31] KING, F.B., YOUNG, M.F., DRIVERE-RICHMOND, K., & SCHRADER, P.G.（2001年）。定义远程学习和远程教育。AACE杂志，9（1），1-14。

[32] KÖNIG, J., JÄGER-BIELA, D.J. 和 GLUTSCH, N.
(2020)。在新冠肺炎学校停课期间适应在线教学：德国早期职业教师的教师教育和教师能力影响。欧洲教师教育杂志，43（4），608-622。https://doi.org/10.1080/02619768.2020.1809650

[33] LAPADA, A.A., MIGUEL, F.F., ROBLEDO, D.A.R., & ALAM, Z.F.（2020年）。教师的新冠肺炎意识、远程学习教育经验以及对机构准备和挑战的看法。国际学习、教学和教育研究杂志，19（6），127-144。https://doi.org/10.26803/ijlter.19.6.8

[34] LEACOCK, C.J., WARRICAN, S.J. 和 WARRICAN,
S.J.（2020年）。帮助教师应对东加勒比地区的新冠肺炎：准备、公平和关怀问题。教学教育杂志，46（4），576-585。https://doi.org/10.1080/02607476.2020.1803733

[35]曼夫索，L.（2020年）。从紧急远程教学到严格的在线学习。取自https://edtechmagazine.com/higher/article/2020/05/emergency-remote-teaching-rigorous-online-learning-perfcon

[36] MANSOR, A.N., ZABARANI, N.H., JAMALUDIN, K.A., MOHD NOR, M.Y., ALIAS, B.S., & MANSOR, A.Z.（2021年）。家庭学习(HBL)
教师准备量表：仪器开发和人口统计分析。可持续性，13（4），2228。https://doi.org/10.3390/su13042228

[37] MARGARYAN, A., LITTLEJOHN, A., & VOJT, G.
(2011)。数字原住民是神话还是现实？大学生对数字技术的使用。计算机与教育，56（2），429–
440。https://doi.org/10.1016/j.compedu.2010.09.004

[38] MORAL, C., MARTÍN-ROMERA, A., MARTÍNEZ-VALDIVIA, E., & OLMO-EXTREMERA, M.
(2018)。从领导学习的角度来看，在弱势环境中成功担任中学校长。学校领导和管理，38（1），32-
52。https://doi.org/10.1080/13632434.2017.1358161

[39]摩根，H.（2020年）。在大流行期间实施远程学习的最佳实践。票据交换所：教育策略、问题和思想杂志，93（3），135-
141。https://doi.org/10.1080/00098655.2020.1751480

[40] MUKH, Y.N.A. 和TARTEER, S.
(2021)。新冠肺炎大流行期间信息通信技术中心在巴勒斯坦大学中的作用。西南交通大学学报, 56(4), 457-469. https://doi.org/10.35741/issn.0258-2724.56.4.32

[41] OZTURK, D.S., OZTURK, F., & OZEN, R.
(2018)。未来教师准备度与网络远程教育满意度的关系。土耳其远程教育在线杂志，19（1），147–
162。https://doi.org/https://doi.org/10.17718/tojde.382791

[42] PSANI, C.F., AMELIA, R., & HASSAN, Z.
(2020)。新冠肺炎对印度尼西亚教育部门的影响：挑战和战略。动态与控制系统高级研究杂志，12（7-特刊），1722-
1731。https://doi.org/10.5373/JARDCS/V12SP7/20202281

[43] PHAN, T.T.N. & DANG, L.T.T.（2017）。教师在线教学准备：批判性审查。国际开放和远程电子学习杂志，3(1)，1-16。取自 https://ijodel.com/wp-content/uploads/2017/12/001_Phan_Dang.pdf

[44] RAFFERTY, A.E. 和 SIMONS, R.H.
(2006)。对微调和企业转型变革准备就绪的先决条件的考察。商业与心理学杂志，20, 325–350。https://doi.org/10.1007/S10869-005-9013-2

[45] RASMITADILA, R., ALIYYAH, R.R., RACHMADTULLAH, R., SAMSUDIN, A., SYAODIH, E., NURTANTO, M., & TAMBUNAN, A.R.S.（2020年）。新冠肺炎大流行期间小学教师对在线学习的看法：印度尼西亚的案例研究。民族和文化研究杂志，7（2），90-
109。https://doi.org/10.29333/ejecs/388

[46] SHAH, P.
(1998)。谁是员工的社会参照物？使用网络视角来确定参照他人。管理学会杂志，41（3），249–268。https://doi.org/10.5465/256906

[47] SHIUE, Y.
(2007)。通过计划行为分解理论研究教师教学技术使用的来源。教育计算研究杂志，36（4），425–453。https://doi.org/10.2190/A407-22RR-50X6-2830

[48] SOKAL, L.J., TRUDEL, L.G.E. 和 BABB, J.C.
(2020)。在变革时期支持教师：新冠肺炎大流行期间的工作需求-
资源模型和教师倦怠。国际当代教育杂志，3（2），67-74。https://doi.org/10.11114/ijce.v3i2.4931

[49]索拉，S.M.（2006年）。城乡学校马来语教师对信息和通信技术（信息通信技术）应用的认知和准备程度。硕士论文。班吉：马来西亚国民大学。

[50] TAUSON, M. 和 STANNARD, L.
(2018)。教育科技用于在紧急情况和流离失所环境中学习：严格审查和叙述综合。救救孩子。取自
https://resourcecentre.savethechildren.net/document/edtech-learning-emergencies-and-displaced-settings-rigorous-review-and-narrative-synthesis/

[51]托克罗，C.M.（2020年）。新冠肺炎大流行期间高等教育的挑战和机遇：菲律宾背景。教学研究，5（4），em0063。https://doi.org/10.29333/pr/7947

[52] TRAFIMOW, D., SHEERAN, P., CONNER, M., & FINLAY, K.A.（2002年）。感知行为控制是多维结构的证据：感知控制和感知困难。英国社会心理学杂志，41（1），101-
121。https://doi.org/10.1348/014466602165081

[53] TSCHANNEN-MORAN, M., & GAREIS, C.
(2004)。校长的效能感：评估一个有前途的结构。教育管理杂志，42（5），573-
585。https://doi.org/10.1108/09578230410554070

[54]塔尔萨种子研究。（2020年）。新冠肺炎大流行期间的家长、老师和远程学习：来自俄克拉荷马州塔尔萨的快照。取自
https://medium.com/@TulsaSEED/parents-teachers-and-distance-learning-during-the-covid-19-pandemic-a-snapshot-from-tulsa-ok-5b5fdb54ea18

[55] TUMWESIGE, J.
(2020)。新冠肺炎教育中断和响应：重新思考乌干达的电子学习。取自
https://www.kas.de/documents/280229/8800435/CO

VID-19+Educational+Disruption+and+Response+-+Rethinking+e-Learning+in+Uganda.pdf/6573f7b3-b885-b0b3-8792 -04aa4c9e14b7?t=1589283963112

[56]马来西亚联合国儿童基金会。（2020年）。新冠肺炎是一场儿童权利危机。取自 https://www.unicef.org/malaysia/media/1361/file/COVID_Newsletter_1.pdf

[57]联合国教育、科学和文化组织。（2020一个）。针对新冠肺炎学校停课的远程学习策略。取自 https://unesdoc.unesco.org/ark:/48223/pf0000373305

[58]联合国教育、科学和文化组织。（2020b）。支持教师在学校停课期间保持学习的连续性。取自 https://en.unesco.org/sites/default/files/covid-19-ed_webinar2-supporting_teachers_to_maintain_continuity_of_learning_during_school_closures-report-en.pdf

[59]联合国教育、科学和文化组织。（2020c）。教科文组织新冠肺炎教育应对措施：教育部门问题说明，问题说明 N° 7.1。从文件中检索：///C:/Users/%D0%9F%D0%BE%D0%BB%D1%8C%D0%B7%D0%BE%D0%B2%D0%B0%D1%82%D0%B5%D0%BB%D1%8C/下载/COVID-19%20Education%20Issue%20Note%207.1%20School%20reopening.pdf

[60] VENKATESH, V., & 戴维斯, F.D.（2000年）。技术接受模型的理论扩展：四个纵向实地研究。管理科学，46（2），186-204。https://doi.org/10.1287/MNSC.46.2.186.11926

[61] VENKATESH, V., MORRIS, M.G., DAVIS, G.B., & DAVIS, F.D.（2003年）。用户对信息技术的接受度：走向统一观点。管理信息系统季刊，27(3)，425–478。https://doi.org/10.2307/30036540

[62]文泰恩，R.J.（2018年）。在线教学环境中的教师准备：以教育系教师为例。教育、管理和社会科学杂志，2（1），94-106。取自https://psurj.org/wp-content/uploads/2019/05/JEMSS-2019-013.pdf

[63] VIOLATO, C., MARINIZ, A., & HUNTER, W. (1989)。对计算机态度的四因素模型的验证性因素分析：对职前教师的研究。教育计算机研究杂志，21, 199–213。https://doi.org/10.1080/08886504.1989.10781915

[64] VU, C.T., HOANG, A.D., THAN, V.Q., NGUYEN, M.T., DINH, V.H., LE, Q.A.T., & NGUYEN, Y.C.（2020年）。越南教师在新冠肺炎大流行期间的观点和感知支持的数据集。数据简介， 31, 105788. https://doi.org/10.1016/j.dib.2020.105788

[65] WANG, S.-K., HSU, H.-Y., CAMPBELL, T., COSTER, D., & LONGHURST, M. (2014)。对中学科学教师和学生在课堂内外使用技术的调查：考虑数字原生代是否比他们的老师更精通技术。教育技术研究与开发，62（6），637–662。https://doi.org/10.1007/s11423-014-9355-4

[66]世界银行。（2020年）。关于教育系统应对新冠肺炎的指导说明。取自 https://documents1.worldbank.org/curated/en/450881585235950757/Guidance-Note-on-Education-Systems-Response-to-COVID19.pdf

[67] YUEN, A.H.K., & MA, W.W.K.（2008年）。探索教师对电子学习技术的接受程度。亚太教师教育杂志，36（3），229–243。https://doi.org/10.1080/13598660802232779

[68] ZHAO, J., XIAO, H., LI, Y., WEN, D., XU, P., FU, Y., & ZHAO, G. (2020)。中国医学院校大规模远程在线教育应对新冠肺炎大流行的经验。https://doi.org/10.21203/rs.3.rs-29678/v1