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A Study of Technostress Levels of Secondary School Teachers in Malaysia During the COVID-19 Pandemic

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Abstract. The study examined the level of technostress of teachers in secondary schools in Malaysia. The COVID-19 pandemic altered human life patterns, and the Movement Control Order restricted most community activities. Prior to the outbreak of COVID-19, the Ministry of Education had exposed teachers to online learning and encouraged them to use it. This study focused on five sub-variables of technostress, that is orientation towards the learning-teaching process, profession, technical issues, individual and social orientation. A total of 1,185 teachers from 13 states were selected as a study sample using a stratified sampling technique. Items for each variable were constructed, based on literature related to technostress and expert validation. Findings show that teachers' technostress levels are high ($M=3.670$, $SD=4.30$), and the results of the t-test analysis show that there were no significant differences in technostress of secondary school teachers in Malaysia in terms of gender ($t(1185)=1.762$, $p>0.05$) and location ($t(1185)=1.962$, $p>0.05$).

Understanding technostress and how technology affects individuals may help to reduce the potential physical and psychological harm that could be caused by technostress.

Keywords: technostress; learning-teaching processes; professional orientation; technical issues; social focus

1. Introduction

Technology has had a tremendous impact in all areas of life, particularly education. It has greatly changed the way teachers and students experience learning and teaching processes. The use of technology in schools has been influenced by various factors, such as knowledge, skills, facilities, and school constraints. Several studies have found that teachers' beliefs regarding the use of technology in their daily work at school is a determining factor for their ability to integrate technology in their work. The use of technology in the community and the workplace environment may lead to technostress in educators who apply the latest technology during learning and teaching sessions. Thus, technostress could affect job satisfaction of teachers with heavy workloads.

The global COVID-19 outbreak caused the use of technology in education settings to be subjected to scrutiny. According to Penado Abilleira et al. (2021), teachers' levels of technostress increased during the COVID-19 outbreak, and technology dependency for teaching and learning became a burden for teachers, who faced an additional workload of administrative tasks, especially when working from home, thus, increasing their stress levels. Online teaching and learning became the platform used by the Ministry of Education Malaysia during the period when the Movement Control Order was in force. Educational technology has, thus, become an increasingly significant component of improving students' teaching and learning processes. The community entrusts to teachers the development of this targeted human capital (Hanifah et al., 2021).

Teachers must be equipped with the knowledge and skills necessary to integrate technology into their classroom instruction. However, for many teachers, using technology is overwhelming and distressing. Work fatigue of teachers also affects student productivity. Work fatigue is multidimensional, and it has psychological and physical symptoms. Psychological symptoms include emotional exhaustion, depersonalisation and a decline in personal performance (Acker, 2010). Education in Malaysia has undergone dynamic changes to adapt to the current environment, and it will have to make further changes in the future to meet environmental demands. Several committees have been appointed to evaluate the national education system (Hanifah et al., 2019).

Research findings on technology in education have primarily focused on enhancing students' learning processes. However, studies on how teachers have been affected by new technologies that enable improved student learning are limited. Technology can be responsible for changing people's lives in ways that are not always appropriate, because the changes can disrupt personal and social connections, and affect health negatively. Adopting technology can become a

source of stress and anxiety for teachers, and can affect their daily lives negatively, particularly when educational technology integration is sought despite the absence of technical resources and equipment required for proper application.

The increase of stress in the workplace is partly due to progress towards an era of globalisation, which involves societal change, technological advancement and shifts in the availability of resources and structure (Zafir & Fazilah, 2006). Individuals experience job stress because they have little or no control over their jobs, or when job demands exceed their capabilities (Steven & Kleiner, 1994). Stress can be experienced by anyone, at any level of an organisation. High levels of stress can interfere with the productivity of teachers and can lead to emotional and physical problems. This study examined technostress levels of secondary school teachers in Malaysia.

2. Literature

Technology-related mental stress is now known as technostress, which encompasses excessive physiological and emotional reactivity (Weil & Rosen, 1997). According to more current definitions, dependency on information and communication technologies (ICT) is characterised by a physical and psychological toll and an increase in computational complexity and faster ICT-driven job changes (Atanasoff & Venable, 2017). Models and classifications of stress fall into three major categories: transactional and perceived stress, biology, and occupational health. Technostress refers to a psychological relationship between humans and modern technologies (Sami & Iffat, 2010). It is a consequence of altered work and engagement behaviours due to the use of current information technologies at work and at home. Technostress is “modern disease of adaptation caused by an inability to cope with new computer technologies, affecting mental health in a manner which may manifest as a struggle to accept computer technology, or as over-identification with computer technology” (Craig, 1984). A few of the early scholarly studies on technostress describe it as an undesirable phenomenon caused by using computing and communications equipment, such as computers, tablets and mobile phones (Sami & Iffat, 2010).

Technology has changed how individuals work, as technology is a support tool that enhances an individual’s work and personal activities, leading to a focus on individual efficiency. Technology allows individuals to work flexible hours, and leaves them with time to carry out other activities too. As a result, technology has been responsible for changes in people’s lives, though not all positive, such as the disruption of personal and interpersonal relationships, and effects on people’s health.

Technology education has become an essential element of improving student learning, and requires teachers to possess the skills needed to use technology as part of their teaching methods; both requirements are, to some extent, causing stress for teachers. According to a study by Jose and Mohd Matore (2021), the stress and anxiety levels of teachers are high due to technology in the classroom. Using technology as a tool in education has as its goal improving students’

learning processes, but research on how teachers have been influenced by the advent of technologies that enable student learning remains scarce.

Education often demands that technology is used, despite shortages of the technical resources and equipment needed for proper didactic use. This creates conflict between teachers, and disrupts relationships with colleagues or other people involved in the teaching environment. Stress in the workplace refers to the response individuals present when faced with threatening situations, and being unable to use new technologies. Stress and anxiety are among the main adverse symptoms shown by teachers when they have to use technology in education. The demand for increased use of technology is also a source of anxiety, fear or distress.

Teachers need training in the use of technology (Çoklar & Bozyiğit, 2021; Şendurur & Arslan, 2017). Although training in the use of non-digital materials is provided within the educational content framework, teachers must also know how to use the internet and digital technologies, for material creation, production and selection (Chase & Laufenberg, 2011).

Digital technology use for teaching is increasing – particularly in light of the recent global outbreak of COVID-19. Education stakeholders from all walks of life are increasingly focused on using technology (Marinoni et al., 2020). Processes of distance education have forced both teachers and students to adapt rapidly, and integrating digital technology into education is becoming more and more important.

Most teachers in secondary schools report significant stress levels due to heavy workloads, government mandates and the challenge of meeting the needs of their students (Herman et al., 2018; Herman et al., 2020). Teachers have been put in a position of having to comprehensively manage stress on their own (Ansley et al., 2021), and technostress, for example, can lead to burnout, which is characterised by emotional exhaustion or a loss of enthusiasm for teaching, depersonalisation, detachment from the profession and students, and a lack of personal relationships. According to systematic literature reviews, comprehensive reports and meta-analyses, stress is dangerous for teachers, the education workforce and students. High-stakes student examinations, extreme workloads and student behaviour have been highlighted as factors affecting teacher stress (Bettini et al., 2017; Owen, 2015; Richards, 2012). Teachers who report high levels of involvement in deliberate coping strategies, such as self-care and social and leisure activities, had lower levels of burnout than teachers reporting low levels of coping engagement (Herman et al., 2018). However, according to Beltman et al. (2011), in most cases, teacher education programmes do not incorporate stress management training to prepare aspiring teachers.

Teachers cooperate with the school and community to realize its mission diligently and persistently, as outlined in the Code of Teaching Ethics. Hackman and Oldham (1974) explain that the task of a teacher is important, because it can significantly affect the lives or well-being of others and interdependence in schools' organization. In addition, one of the characteristics of professional

teachers is extensive knowledge. This knowledge includes knowledge of education, psychology, communication and classroom management, and general knowledge. Knowledge of education and classroom management is fundamental for ensuring that students are managed adequately during the teaching and learning process. Knowledge of psychology and communication is needed by school teachers to ensure students are treated in a friendly manner, that any problems that exist are resolved, and conflict in the classroom are avoided. Finally, teachers, as educators, are endowed with various responsibilities (Price & Mueller, 1986). Teachers can influence students, so that they change, learn, grow, become independent and responsible, and achieve goals.

The results of a study by Brooks and Califf (2017) show that feedback, task identity, task importance, and task diversity can reduce the influence of social media technostress on job performance. This suggests that technostress caused by social media can be controlled. Moreover, a study by Okolo et al. (2018) found that redesigning jobs did not reduce technostress, and there was a positive relationship between technostress and employees. The situation does not necessarily reduce employee stress engagement. Moderate stress levels can serve as a motivator, while high stress levels may harm individuals. Umair et al. (2019) investigated the influence of technostress on employee satisfaction in economy. The study found that workload is considered to cause stress, and job autonomy can reduce that stress. Also, if employees receive negative feedback, they will feel insecure because the likelihood of their future work assignments will be increases. Mahapatra and Pillai (2018) studied the causes of technostress and emotional, mental, and physical fatigue in relation to job-resource demands. They found that the technostress exacerbates the negative effects of job demands, such as overwork, work stress and complexity. Alam (2016) studied technostress and productivity through survey evidence from the aviation industry, and found evidence that technostress strengthens existing organizations, as teachers become more productive when they are burdened with variety of job roles.

The need to use ICT often adds to the job stress experienced by employees (Tarafdar et al., 2015). It has a negative impact: it can increase fatigue and reduce work performance (Tarafdar et al., 2007). Furthermore, constant pressure to integrate technology in the field of education by institutions and society, and a lack of knowledge and support results in technostress for teachers (Longman, 2013). Among the factors influencing technostress levels are technological intrusion, excessive technology, technological complexity, technology insecurity, and uncertainty about a particular technology (Ragu-Nathan et al., 2008; Tarafdar et al., 2015). Technological intrusion occurs when using ICT violates the limits of time and space, and cause teachers to continue doing their jobs at any time of the night and day. Excessive technology use is related to computers forcing employees to do a greater volume of work at a greater speed. Technology insecurity is stress caused by a lack of personal knowledge about ways to cope and adapt to the technology itself. Technology uncertainty means employees are afraid of wreaking havoc on new technology due to the misuse of technology, anxiety, ignorance, or incompetence.

Stress is a risk factor for developing depression, which affects individual productivity. Depression is a health problem that is recognised for involving mood swings, decreased productivity, loss of initiative and general changes of interest (Desouky & Allam, 2017).

In this study, stress measurement was based on the development of technostress levels of secondary school teachers in Malaysia through indicators that were learning-teaching-process oriented, profession oriented, technical-issue oriented, and personally and socially oriented. This study aimed to examine the level of technostress of secondary school teachers in Malaysia based on these variables.

3. Methodology

This was a quantitative study that used a survey design. The survey method was selected because the study used a questionnaire instrument that was distributed online through Google Forms to assess the level of technostress of secondary school teachers throughout Malaysia. This method has the advantage that it can be administered directly to the respondents (Burns, 2000; Sabitha, 2006; Zainuddin, 2010). As explained in the next sections, the study sample included 1,185 secondary school teachers, who were asked to complete a questionnaire, so that the researchers could determine their levels of technostress based on five indicator categories: teaching and learning process, the profession, technical problems, and on personal and social levels.

3.1 Study location

The study was conducted with secondary school teachers throughout Malaysia. This diverse range of respondents was selected to ensure that dynamic information data distribution was achieved.

3.2 Population and Study Sample

The study population was 149,108 teachers from 13 states and three federal territories in Malaysia. Through simple random strata sampling, 1,185 teachers were selected as the study sample. Sample calculations were based on Krejcie and Morgan (1970).

Table 1. Population and Sample

State	Teacher population	Sample
Johor	18,253	$18,253/149,108 \times 1,185 =$ 141
Kedah	11,018	85
Kelantan	10,535	81
Melaka	4,961	38
Negeri Sembilan	5,896	45
Pahang	9,102	70
Perak	14,308	114
Perlis	1,706	36
Pulau Pinang	7,436	57
Sabah	14,207	109

Sarawak	13,283	102
Selangor	22,480	173
Terengganu	7,672	65
Wilayah Persekutuan Kuala Lumpur	7,082	54
Wilayah Persekutuan Labuan	486	7
Wilayah Persekutuan Putrajaya	683	8
Total	149,108	1,185

3.3 Instrument

A self-developed questionnaire with items rated on a five-point Likert scale was used to measure technostress indicators; demographic information was also collected. The questionnaire comprised two sections. Section A covered respondent background, including state, location, age, gender, race, marriage status, level of education, estimated monthly household income, number of household members, type of digital devices used and daily internet usage. Section B focused on technological variables, covering sub-variables in five categories (learning-teaching process, profession, technical issues, personal and social factors) adapted from Çoklar et al. (2017) to assess the technostress of teachers. The data were analysed descriptively using SPSS v. 21.

3.4 Instrument Reliability

Table 2 shows the instrument reliability for teachers' technostress, with Cronbach's alpha values measuring the constructs' internal consistency. According to Babbie (2007), Cronbach's alpha values are classified based on the reliability index, where values of 0.90–1.00 indicate very high reliability, 0.70–0.89 high, 0.30–0.69 moderate and 0.00–0.30 low reliability. The analysis results show that the Cronbach's Alpha value for the technology variable was 0.881, which indicates that the instrument has high reliability. Content experts also reviewed the instrument for content validity (Table 3), to assess the extent to which the set of items is relevant to the content domain to be measured (Bhattacharjee, 2012). After corrections and expert recommendations, a pilot study was conducted to assess the reliability value of the items.

Table 2. Instrument Reliability

Variables	Items	Cronbach's Alpha
Technostress	31	.881
Learning-teaching-process oriented	7	.902
Profession oriented	6	.783
Technical issue oriented	7	.757
Personal oriented	6	.889
Social oriented	5	.664

Table 3. Fields of Expertise of Experts Consulted on Questionnaire

Expert	Field	Institution
Expert 1	Education	Universiti Pendidikan Sultan Idris
Expert 2	Education	Universiti Pendidikan Sultan Idris
Expert 3	Language and Communication	Universiti Pendidikan Sultan Idris
Expert 4	Education	Universiti Pendidikan Sultan Idris
Expert 5	Language	Universiti Teknologi Mara

4. Findings

Table 4 shows the demographic distribution of secondary school teachers in Malaysia. A total of 1,185 respondents were selected to complete the questionnaire, which was distributed online. Respondents originated from all 13 states and three federal territories in Malaysia; 609 respondents (51.4%) were from urban areas, and 576 respondents (48.6%) were from rural areas. Respondents can be divided into five age ranges: 41–50 years (39.2%), 31–40 years (29.3%), 51–60 years (25.5%), and 21–30 years (6.0%). There were 338 male respondents (28.5%) and 847 female respondents (71.5%). Most respondents were Malay (77%), followed by Chinese (9.9%), Bumiputera Sarawak (8.5%), Indian (2.2%), Sabah Bumiputera (1.9%) and Other (0.4%). A total percentage of 84.6% of respondents had Bachelor's degrees, followed by Master's degrees (13.2%), diplomas (1.5%), Doctorates (0.6%) and Other qualifications (0.1%). A percentage of 70.9% of respondents had an estimated household income in the middle of M40, followed by 20.4% of respondents at T20 and 8.7% at B40. The results are that 98.1% of respondents used smartphones, 89.3% used laptops, 27.5% used tablets, 25.2% used desktop computers and 1.6% used other technological devices. A total of 311 respondents (26.2%) spent more than 10 hours per day using technology, followed by 23.1% at 4–6 hours, 18.8% at 6–8 hours, 15.5% at 8–10 hours, 14.4% at 2–4 hours and 1.9% (less than 2 hours per day).

Table 4. Profile of Respondents

Respondent Background		N	%
States	Johor	141	11.9
	Kedah	85	7.2
	Kelantan	81	6.8
	Melaka	38	3.2
	Negeri Sembilan	45	3.8
	Pahang	70	5.9
	Perak	114	9.6
	Perlis	36	3.0
	Pulau Pinang	57	4.8
	Sabah	109	9.2
	Sarawak	102	8.6
	Selangor	173	14.6
	Terengganu	65	5.5
	Wilayah Persekutuan Kuala Lumpur	54	4.6
	Wilayah Persekutuan Labuan	7	.6
	Wilayah Persekutuan Putrajaya	8	.7

Location	Urban	609	51.4
	Rural	576	48.6
Age	21-30	73	6.0
	31-40	347	29.3
	41-50	464	39.2
	51-60	301	25.5
Gender	Male	338	28.5
	Female	847	71.5
Races	Malay	913	77.0
	Chinese	117	9.9
	Indian	26	2.2
	Bumiputera Sarawak	101	8.5
	Bumiputera Sabah	23	1.9
	Others	5	.4
Education level	Diploma	18	1.5
	Bachelor's degree	1,002	84.6
	Master's degree	157	13.2
	Doctorate	7	.6
	Others	1	.1
Estimated household income	Lowest 40% (B40 <RM4,850)	103	8.7
	Mid 40% (M40 RM4,850-RM10,959)	840	70.9
	Highest 20% (T20 > RM10,959)	242	20.4
Digital devices	Smartphone	1,163	98.1
	Laptop	1,058	89.3
	Desktop	299	25.2
	Tablet	326	27.5
	Others	19	1.6
Daily internet usage	0-2 hours	22	1.9
	2-4 hours	171	14.4
	4-6 hours	274	23.1
	6-8 hours	223	18.8
	8-10 hours	184	15.5
	More than 10 hours	311	26.2

4.1 Level of Technostress of Secondary School Teachers in Malaysia

The technostress levels of secondary school teachers in Malaysia were analysed through five variable categories: learning-teaching-process oriented, profession oriented, technical issue oriented, personal oriented, and social oriented. This study identified three technostress levels: low, moderate, and high (Best, 1997); the cut-off points are shown in Table 5.

Table 5. Cut-off Points for Each Construct

Scale	Level
Score 1.00-2.33	Low
Score 2.34-3.66	Moderate
Score 3.67-5.00	High

As shown in Table 6, the overall level of teachers' technostress was high, with a mean (M) value of 3.67 (SD=0.43); similar high values were found for three of the five technostress sub-variables, namely profession oriented (M=3.718, SD=0.619), technical issue oriented (M=3.823, SD=0.616) and personal oriented (M=3.708, SD=0.633), while moderate levels are found for two of the sub-variables - teaching-learning-process oriented (M=3.62, SD=0.714) and social oriented (M=3.421, SD=0.685).

Table 6. Level of Technostress of Secondary School Teachers in Malaysia

Variables	Low		Moderate		High		Mean	SD	Level
	N	%	N	%	N	%			
Technostress	1	.1	594	50.1	590	49.8	3.670	.430	High
• Learning-Teaching-Process Oriented	51	4.3	516	43.5	618	52.2	3.621	.714	Moderate
• Profession Oriented	28	2.4	571	48.2	586	49.5	3.718	.619	High
• Technical Issue Oriented	16	1.4	418	35.3	751	63.4	3.823	.616	High
• Personal Oriented	25	2.1	578	48.8	582	49.1	3.708	.633	High
• Social Oriented	66	5.6	710	59.9	409	34.5	3.421	.685	Moderate

4.2 Technostress Differences among Teachers by Gender

In order to examine the differences in technostress among secondary school teachers according to gender, a null hypothesis was created, which states that there is no difference in technostress among teachers according to gender. Table 7 shows the differences in technostress among teachers by gender. The findings show that the mean and standard deviations of technostress of male teachers is M=3.704, SD=.450, while the mean and standard deviation for female teachers is M=3.656, SD=.421. The mean difference between technostress of male and female teachers is only .048. The t-test analysis found no significant difference between technostress of male and female teachers, with a value of $t(1183)=1.762$, $p>.05$. The significance level is .078, which is insignificant, because the value is more significant than 0.05. Statistically, the technostress of male teachers was almost the same as the technostress of female teachers.

Table 7: T-test analysis of Teachers' Technostress Based on Gender

Technostress Level	Gender	n	Mean	SD	df	t	p
	Male	338	3.704	.4502	1185	1.762	.078
	Female	847	3.656	.4214			

4.3 Technostress Differences among Teachers by Location

To examine the differences in technostress among teachers according to location, a null hypothesis was formed that states that there is no difference between the technostress of teachers according to location; see Table 8. The findings show that the technostress mean and standard deviation for teachers living in urban areas is M=3.693, SD=.422, while the mean and standard deviation of technostress

standards of teachers living in rural areas is $M=3.645$, $SD=.437$. The mean difference between technostress of teachers living in urban and rural areas is 0.050. The t-test analysis shows no significant difference between technostress of teachers living in urban and rural areas, with a value of $t(1183)=1.962$, $p>.05$, which is significant. This means that the technostress of teachers living in urban and rural areas varies statistically. Thus, the null hypothesis is rejected.

Table 8: T-test analysis for Teachers' Technostress Level by Location

Technostress Level	Location	n	Mean	SD	df	t	p
	Urban	609	3.6939	.422	1185	1.962	.050
	Rural	576	3.6449	.436		1.961	.050

5. Discussion

A study by Lee (2018) and Çoklar and Bozyiğit (2021) found that the technostress levels of teachers are moderate. However, the present study found that teacher technostress is high (Penado Abilleira et al., 2021), perhaps because teachers' levels of technostress increased during the COVID-19 outbreak. The learning-teaching-process-oriented factors cover teachers' capability and comfort regarding teaching with the aid of technological tools. Including physical material oriented to digital technology as part of the education process could ensure that teachers are comfortable about using devices during sessions with students, while the use of technology could make teachers more productive regarding improving students' skills.

The belief that using technology makes a teacher's job easier is related to the profession oriented sub-variable. Teachers know that using the latest technology enhances the value of the teaching profession. The existence of technology allows the exploration of knowledge without limitations while helping to increase students' understanding of the topics taught. Teachers can become more effective in facilitating the delivery of information with technology. Nevertheless, it is clear that teachers believe that technology increases their workload. Three aspects are important for integrating technology into education: teachers' technological skills, their ideas about technology, and perceived technology hurdles (Hew & Brush, 2007)

With regard to the technical issue oriented sub-variable, teachers need to know that using technology involves issues such as the possibility of digital equipment being attacked by virtual viruses, the data stored on devices can be lost, and there can even be problems with the need to remember too much information, such as account usernames and passwords. Teachers are also burdened by the high cost of technology, for purchase, repair and maintenance, as well as paid websites and other costs. Finding stable internet access is another technical issue. The use of digital devices also has an impact in the long term, though experience in using technology plays an important role in reducing technostress (Li & Wang, 2021).

The personal oriented sub-variable covers aspects of teachers' ability to acquire digital technology skills and knowledge. They know they need to improve their skills through practical use. Education in the technology is essential to improve

teachers' skills, including understanding of terms related to ICT. Technology must be used responsibly. Teachers' technostress levels for this sub-variable were moderate, possibly due to ability to measure instructional procedures and their skills in using the technology.

Regarding the social oriented sub-variable, the use of digital devices for an extended time may cause discomfort. Social interaction between students and teachers in the education process are affected by the use of technology. Technology overuse can lead to health problems, such as blurred vision, hearing loss and headaches. Being experienced in using technology effectively and indirectly helps reduce technostress (Çoklar & Bozyiğit, 2021; Lee, 2018; Li & Wang, 2021; Penado Abilleira et al., 2021). Teaching is a high-stress job, particularly when it is combined with the need to use advanced technology. Teaching requires teachers to manage stress by developing healthy coping strategies and social-emotional competencies related to positive learning environments, in order to de-escalate high-stress settings.

6. Conclusion

The main findings of this study are that technology use might have a negative psychological impact on teachers, particularly in terms of stress. Teachers have high levels of technostress, and it is critical to identify risk and health factors in technology-related relationships to enable preventive and interventional approaches to reducing this stress. Administrators and school organisations must approach this issue with the necessary seriousness by providing teachers with technology-related training.

This study examined the levels of technostress of teachers in Malaysia, and results may not be generalisable to other populations. Future studies could be designed for teacher populations with different characteristics. The use of an attitude scale regarding digital-oriented ICTs would be warranted, based on prior research.

Teachers should receive more hands-on technology training, so that they develop positive attitudes about the use of technology in the classroom, and to reduce their technostress. Understanding technostress and how technology affects individuals may help to reduce its potential physical and psychological harm.

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