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Factors Affecting Kindergarten Teachers' Digital Competence and their Pivot towards Remote Learning during a Pandemic.

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Abstract

The teachers are expected to respond positively to challenging situations that they may encounter in their profession including the sudden shift to online delivery of education during a pandemic. This study aims to investigate the Factors Affecting Kindergarten Teachers' Digital Competence and their Pivot towards Remote Learning during a Pandemic. The conceptual framework was developed via the theoretical lens of the Technology Acceptance Model and technology readiness. The survey targets the kindergarten teachers and management staff from kindergartens located in Selangor, Penang, Pahang, Perak, Melaka, Johor and Sarawak who had attended the online teaching and learning workshops conducted by the researchers' university in March and April 2020. The sample was recruited through both voluntary response sampling and snowball sampling methods. The survey was conducted online from July 2021 to January 2022 through the platforms of email, Whatsapp, and Facebook. It is found that optimism (H1) and perceived ease of use (H6) have significant and positive relationships with resilience. The findings of this study are significant to help Malaysian kindergarten teachers and educators to understand the factors that can affect their readiness and acceptance of technology and resilience.

1.0 Introduction

The World Health Organization (WHO)'s announcement of a global pandemic caused by Covid-19 on 11 March 2020 (Cucinotta & Vanelli, 2020) had a far-reaching impact on schools and pre-tertiary institutions worldwide as institutions were forced to close down to control the spread of the virus. Malaysia's response was on 16 March 2020, when the Movement Control Order (MCO) was imposed and all citizens had to stay at home. However, with children at home and parents working from home, the demand for remote learning for pre-schoolers became a pressing concern for kindergartens and nurseries who wish to stay solvent during this period (Yeoh, 2020). Pre-school teachers were thus, to offer remote learning (a form of online and distance learning) to their pupils at home. Most teachers were likely to be lacking in the online teaching knowledge and skills as this was an abrupt change to their normal teaching as they were used to face to face teaching with technology integrated only sporadically in their lessons (Arumugam & Kanyakumari, 2020).

The advent of digital technologies in the twentieth and twenty-first centuries has created a new landscape of education requiring teachers and educators to integrate more digital and online teaching methods into their classrooms (Mulenga & Marban, 2020). Digital platforms and applications have provided many opportunities for teachers and students to continue their education despite the pandemic. Mulenga and Marban (2020) highlighted that the Covid-19 pandemic makes us better appreciate digital resources and applications and that teachers played a significant role in turning remote learning into a reality. Digital competence,

therefore, becomes fundamental in the twenty-first century. Digital competence is usually referred to as the knowledge, skills, and attitudes needed for the average individual to be able to learn, use and navigate in the digitalised knowledge society (Pettersson, 2017; Ilomäki, Paavola, Lakkala & Kantosalo, 2016). Teachers' professional digital competence defined as the ability to use and integrate technology for educational purposes (Instefjord & Munthe, 2017) is thus fundamental to kindergarten teachers' ability to conduct remote learning.

Teacher resilience has emerged as one factor that enables teachers to face and overcome challenges of remote teaching and learning (Gu & Day, 2013) and (Mansfield, Beltman, Broadley & Weatherby-Fell, 2016). In relation to the teaching profession, Mansfield et al. (2016, p.7) proposed that "resilience may be conceptualised as a capacity, a process and also as an outcome". The capacity for resilience may include the following: improving personal resources such as motivation; an ability to mobilise resources such as support networks; possessing adaptive coping strategies, and an ability to deal with difficulties in order to achieve resilient outcomes (Mansfield et al., 2016). During this period of uncertainty in the pandemic, resilience is a quality that could help teachers to be persistent in facing challenges. Resilience is not just the ability to bounce back from undesirable and terrifying events but more on the ability to be persistent in maintaining the commitment and fulfilling the duties as an educator every single day (Gu & Day, 2013).

Eisenbach, Greathouse and Acquaviva (2020) proposed that in student-centered learning, teachers are expected to design meaningful lessons without overwhelming the students, apply different strategies for students' engagement, while also considering that the accessibility of resources for students might vary. Haverback (2020) also suggested that teachers might face challenges in maintaining their self-efficacy when teaching virtually as compared to face-to-face teaching, and this could lead to teachers feeling insecure. Thus, there is an urgent need to understand the factors that can contribute to teachers' resilience in facing different challenges in virtual education and this is one of the objectives of this proposed study.

More significantly, teachers need to be ready in preparing themselves for online teaching and learning as it has its own unique demands compared to the traditional face-to-face classes. Starkey (2020) found three factors in the integration of ICT in teaching practices towards preparing teachers for the digital age, and these include: firstly, being able to use particular technologies as a teacher; secondly, being able to select and critique which technology to use for a specific teaching purpose; and the third, being able to plan and teach students who are learning through and with digital tools.

Technology acceptance and usage are dependent on how an individual perceives technology and its perceived ease of use and perceived usefulness (Davis, Bagozzi & Warshaw, 1989) and (Godoe & Johansen, 2012). The hypothesis is that perceived ease of use influences perceived usefulness (Davis et al., 1989). Another research paradigm investigates latent personality dimensions to explicate technology usage and an example is the Technology Readiness Index (Parasuraman, 2000). Thus, pre-school teachers' technology acceptance and their technology readiness would probably influence their performance in remote teaching and learning. This proposed study will investigate the relationship between the technology acceptance and readiness of kindergarten teachers in Malaysia with teachers' resilience when they pivot towards remote teaching and learning. An adapted version of an integrated Technology Acceptance Model (TAM) and Teacher Readiness Index designed by Godoe & Johansen (2012) was used to survey the respondents. Additionally, teachers' resilience was measured using an adapted instrument (Mansfield, Beltman, Broadley, & Weatherby-Fell, 2016). To explore further information about kindergarten teachers' digital competence, interviews were conducted with 30 teachers. This proposed study aims to answer the following research questions:

Research Questions

1. What are the factors that affect kindergarten teachers' digital competence in the classroom?

2.0 Literature

2.1 Digital Competence

Digital competence is grounded on basic skills in ICT, i.e. the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet. Gallego-Arrufat, Torres-Hernandez and Pessoa (2019) define digital competence as "the ability to use technologies critically and safely for work, leisure, and communication" (p.54). Digital competence provides vital 21st-century skills and knowledge for teachers and students. Digital competence is essential for learning, work, and active participation in society. For school education, as important as understanding the competence itself is knowing how to help develop it.

Digital competence is the most recent notion describing technology-related skills and is thus, an evolving concept. Several terms have been used to describe the skills and competence of using digital technologies, such as ICT skills, technology skills, information technology skills, 21st-century skills, information literacy, digital literacy, and digital skills. These terms are also often used as synonyms; e.g. digital competence and digital literacy (Krumsvik, 2008). Sometimes the terms are narrow, e.g., internet skills, referring only to a limited area of digital technology, and some of them widen the content to media and literacy, e.g., media literacy skills or digital literacy. Jenkins, Clinton, Purushotma, Robison and Weigel (2006) investigated the necessary digital skills through participatory cultures; they speak about 21st-century literacy, emphasizing social skills instead of individual skills. Moreover, changes in society and culture, based on the new technology, have effects on terms. It is expected that the content and the scope will still change, and that is even expected: Ala-Mutka, Punie and Redecker (2008) recommended in their policy-related paper that the approaches should be dynamic and regularly revised because of the evolving new technologies and their use in society. OECD (2010) suggests that governments should make an effort to identify and conceptualise the required set of skills and competences, and then incorporate them into the educational standards (OECD, 2010); and, as an answer to this suggestion, there are several national projects working for defining national standards.

In this proposed research, digital competence is defined as the ability to use digital technologies critically and effectively in work and life. Professional digital competence in this study refers to the teachers' ability to critically and purposively use and integrate digital technologies into their lessons, assessments and work. Hence, in the context of this study, the digital competence of pre-school teachers would probably depend on how they perceive the usefulness of technology to aid in their remote teaching. Additionally, the hypothesis in this study is that teachers' ability to accept and use technologies effectively is dependent on their personality traits and resilience to changes brought about by challenges or shifts in their normal lives.

2.2 Teacher's Resilience

Resilience is necessary for teachers especially in coping with abrupt changes brought by the pandemic. Day and Gu (2013) highlighted in their study about challenges to teachers' resilience that there is a need to understand the factors that can foster, maintain and deteriorate teachers' resilience especially when it comes to their working conditions. Resilient people are those who could practice their daily life routines despite challenges, remain in

control over their lives and perceive unpredictable changes as rooms for improvement (Donmez, Karasulu, Asantogrul, & Zembat, 2018).

Resilience can be influenced by many factors. Mansfield et al. (2016) stated that "early definitions of resilience focused on identifying the particular risk and protective factors that enabled or constrained resilience and particular traits that characterised resilient individuals" (p.7). Protective factors include both internal and external factors of oneself such as health and self-confidence (internal) and factors linked to one's family or outside the family (external) such as peer groups and teachers (Donmez et al., 2018). In the same study by Mansfield et al. (2016), resilience is viewed as an important quality for teachers in order to stay in the profession despite challenges which suggested that one of the ways it to build resilience by developing a teacher education curriculum that focuses on this and that it will be beneficial for teachers, future employers and their students.

In a study by Le Cornu (2013) where the researcher has focused on the role of relationships in building teachers' resilience, it was found that the relationships between the teachers and their friends, colleagues, students, families and other supportive networks can better develop resilience. Day and Gu (2013) found that the teachers' vocational selves such as the love and passion for children gave them the strength to give their best efforts despite challenges and stress at the workplace. Therefore, it is important for this study to uncover the factors that contribute to teachers' resilience especially when facing such a crisis during this trying time.

3.0 Methodology

The survey research approach used in this study is the quantitative approach. We adopted survey questionnaire items from previous studies (Godoe & Johansen, 2012; Mansfield et al., 2016). See Appendix 1. The questionnaire was created using Google Form and the data was collected over a six-months period between 15 July 2021 and 15 January 2022. The school teachers were requested to invite their friends and colleagues to participate as well. There was no missed data and the samples included in the final analysis were 89.

The survey instrument (Appendix 1) was used to measure the respondents' attitudes and perceptions of their use of digital technologies and their resilience towards the challenges of remote learning. The survey scale is adapted from Godoe and Johansen (2012)'s Integrated Model of TAM and TRI. The scale was modified for educational purposes and remote learning and another construct of Teachers' Resilience (Mansfield et al., 2016) was added to explore the relationships between the three dimensions (Appendix 1). The theoretical framework and the related hypotheses are in the chart below (See Figure 1). Kindergarten teachers' professional digital competence in remote learning is postulated to be premised on the following dependent variables:

Teacher readiness: Dimensions of Personality - Optimism, Innovativeness, Insecurity, Discomfort, Perceived Usefulness and Perceived Ease of Use

Dependent Variable: Teachers' Resilience

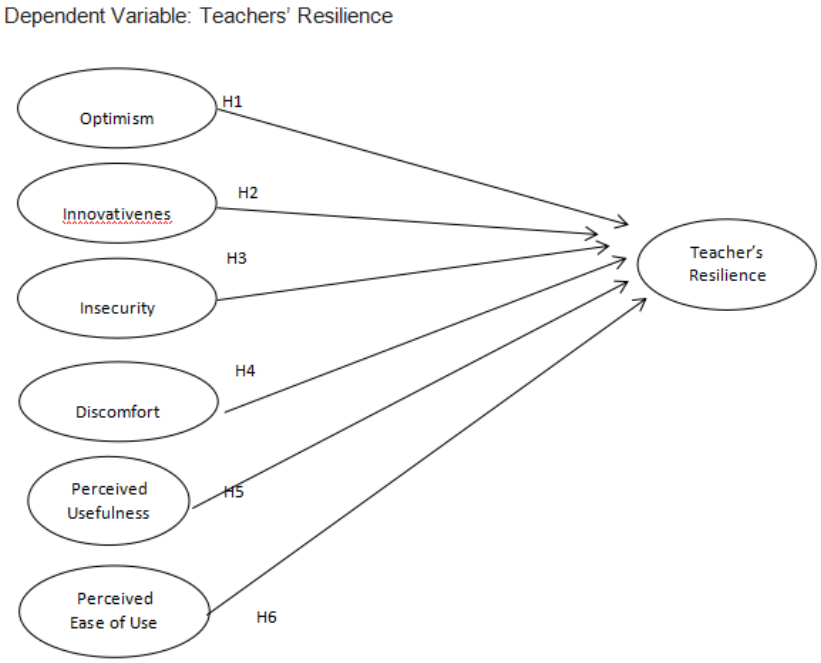

Figure 1. Integrated Model ofTAM, TRI and Teacher Resilience

Hypotheses:

Hypothesis 1: Optimism is positively related to resilience.

Hypothesis 2: Innovativeness is positively related to resilience.

Hypothesis 3 : Insecurity is related to resilience.

Hypothesis 4 : Discomfort is related to resilience.

Hypothesis 5: Perceived usefulness is related to teacher's resilience.

Hypothesis 6: Perceived ease of use is related to teacher's resilience.

4.0 Sampling & Data Collection

The survey targets the kindergarten teachers and management staff from kindergartens located in Selangor, Penang, Pahang, Perak, Melaka, Johor and Sarawak who had attended the online teaching and learning workshops conducted by the researchers' university in March and April 2020. The sample was recruited through both voluntary response sampling and snowball sampling methods. The survey was conducted online from July 2021 to January 2022 through the platforms of email, Whatsapp, and Facebook. Survey participants were assured of anonymity and confidentiality.

4.1 Data Analysis and Results

Reliability and Validity

A reliability and validity check were performed on the survey questionnaire items. The Cronbach's alpha analysis conducted using SPSS were above 0.70 except variable Insecurity - which was close to 0.70 and therefore was not removed from the analysis. The values of Cronbach's Alpha (and composite reliability show good reliability for the survey instrument used in the study (see Table 1).

Table 1: Reliability test for the survey questionnaire items used in the study

Variables	No. of items	Cronbach's Alpha
Optimism (OPT)	**8**	**0.874**
Innovativeness (INN)	**5**	**0.904**
Discomfort (DISCOM)	**8**	**0.831**
Insecurity (INSEC)	**5**	**0.770**
Perceived usefulness (PU)	**6**	**0.924**
Perceived Ease of Use (PEOU)	**4**	**0.921**

Descriptive Statistics

The respondents are kindergarten and preschool teachers from various states in Malaysia. The participant's years of teaching as displayed in Figure 1. Out of 89, 45 of them - approximately 55.1% - have more than 7 years of teaching experience while only 6.7% participants have teaching experience less than a year (refer Table and Figure 2.0).

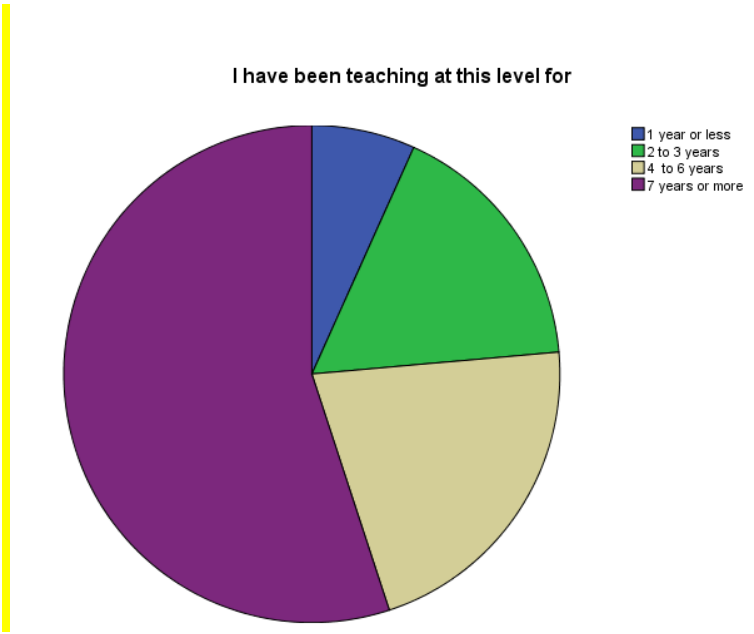

Figure 2.0

Gender:

Majority of the participants are female which is about 84% as displayed in Figure 2.0. Out of 89, 84 of them are female, while only 5% participants are male which is about 5 participants (refer table 2.0 and figure 3.0).

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	female	84	94.4	94.4	94.4
	male	5	5.6	5.6	100.0
	Total	89	100.0	100.0	

Table 2.0

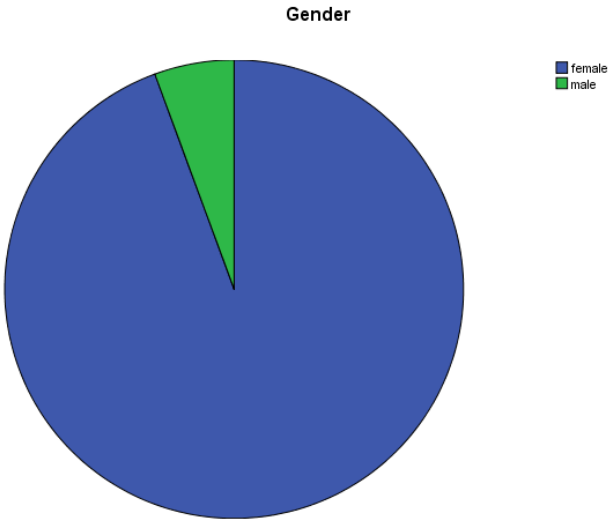

Figure 3.0

When asked to indicate their involvement with the special needs children, we found that the majority of them (84%) have no involvement in handling special needs children while only 5 - approximately 5.6% of them are currently teaching the special needs children (see Table 3.0 and Figure 4.0).

Involvement with Special Needs Children

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	5.6	5.6	5.6
	no	84	94.4	94.4	100.0
	Total	89	100.0	100.0	

Table 3.0

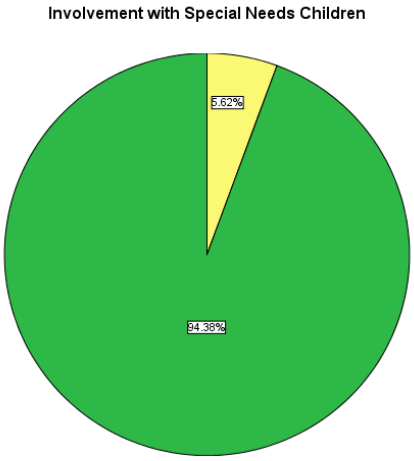

Figure 4.0

For the education level analysis, we found out that the majority of the teachers have a diploma or higher diploma as their highest qualification (53.9%), followed by degree holders which is about 28.1%. There was only one participant who is a Master's holder (1.1%), while the remaining have the certificate qualification as their highest education level (16.9%), (see Figure 5.0 and Table 4.0).

Education Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Certificate	15	16.9	16.9	16.9
	Diploma or Higher Diploma	48	53.9	53.9	70.8
	Degree	25	28.1	28.1	98.9
	Master Degree	1	1.1	1.1	100.0
	Total	89	100.0	100.0	

Table 4.0

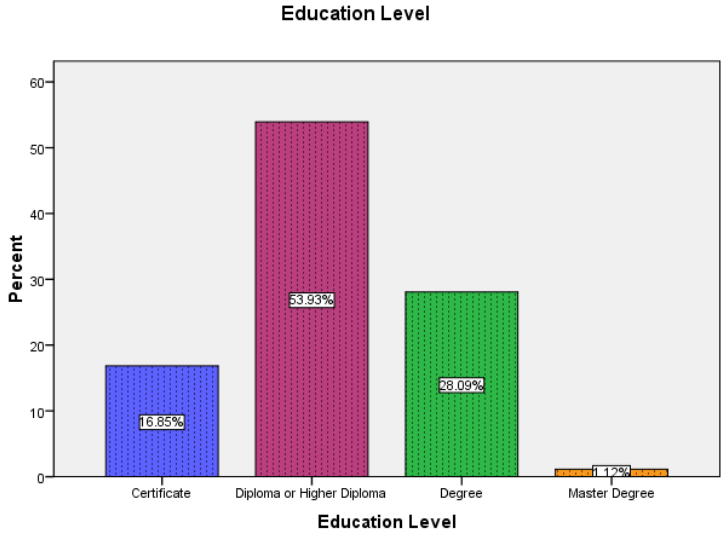

Figure 5.0

ANOVA[c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13.690	2	6.845	26.298	.000[a]
	Residual	22.384	86	.260		
	Total	36.074	88			
2	Regression	15.880	6	2.647	10.748	.000[b]
	Residual	20.193	82	.246		
	Total	36.074	88			

a. Predictors: (Constant), Perceived Ease of Use, Perceived Usefulness

b. Predictors: (Constant), Perceived Ease of Use, Perceived Usefulness, Insecurity, Innovativeness, Discomfort, Optimism

c. Dependent Variable: Teacher Resilience

Table 6.0

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.654	.329		5.034	.000
	Perceived Usefulness	.244	.093	.257	2.638	.010
	Perceived Ease of Use	.366	.079	.449	4.610	.000
2	(Constant)	1.494	.475		3.143	.002
	Perceived Usefulness	.095	.106	.100	.894	.374
	Perceived Ease of Use	.399	.093	.488	4.308	.000
	Optimism	.319	.113	.346	2.813	.006
	Innovativeness	-.137	.084	-.193	-1.623	.108
	Discomfort	.003	.107	.003	.026	.980
	Insecurity	-.038	.099	-.042	-.381	.704

a. Dependent Variable: Teacher Resilience

Table 7.0

Out of all (7) variables entered into the regression analysis, the linear combination of these variables was highly significant (F=26.298) (refer table 7.0). The model accounted for 61.6% of the variance in the teacher resilience's score. The adjusted R square value is .365 and the R value is .616 which is significant in showing the variation of the variance (refer table 6.0). The six hypotheses were tested (refer table 8.0). We have found that optimism (H1) and perceived ease of use (H6) have significant and positive relationships with resilience, B=0.319, p<0.01; B=0.399, p<0.01 respectively.

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.616[a]	.379	.365	.51018	.379	26.298	2	86	.000	
2	.663[b]	.440	.399	.49625	.061	2.224	4	82	.073	1.769

a. Predictors: (Constant), Perceived Ease of Use, Perceived Usefulness

b. Predictors: (Constant), Perceived Ease of Use, Perceived Usefulness, Insecurity, Innovativeness, Discomfort, Optimism

c. Dependent Variable: Teacher Resilience

5.0 Discussion and Conclusion

The findings of this study are significant to give better understanding of the challenges and factors affecting the teachers' resilience especially in remote learning and digital competence. We learned that resilience can be affected by many factors, thus, there could be improvement made by the kindergarten teachers, kindergarten providers, policy makers and perhaps the government to better facilitate the teachers in educating children more effectively regardless of the environment.

In addition, technology requires the teachers to keep up-to-date with technological softwares and applications used for teaching and learning. Teachers need to equip themselves to be ready and flexible in implementing changes related to technology as highlighted in the perceived ease of use and perceived usefulness results in this research.

The study focused only on kindergarten and preschool teachers and thus the questionnaire was directed to the specific population. The sample size for this study is small, thus the results might not be generalizable for the population at large. For further research, the data needs to include a larger sample size in order to learn more about the teachers' resilience more effectively.

6.0 Significance of the Study

6.1 Benefits to Educational Community, Society & Malaysia

This study is significant in order to help kindergarten teachers and educators in Malaysia to learn more about factors that can affect their readiness, resilience and acceptance of technology and digital competence. In addition, this study is one of the pioneering studies on remote learning and it would contribute to the literature and knowledge of the factors that can contribute to kindergarten teachers' digital competence.

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