Pedagogy, ICT Skills, and Online Teaching Readiness as Factors on Digital Competency Practices among Secondary School Teachers in Malaysia

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Abstract: COVID-19 has impacted the globe in the most disastrous ways. The widespread COVID-19 has affected the education system from kindergarten to the university level. Most nations responded with alacrity with numerous alternatives to teaching and learning (T&L) strategies. Home-based T&L took place although this belligerent strategy did not fully benefit all students due to their inaccessibility to technology. However, as far as the matter is concerned, home-based T&L was the only option that the ministry could execute. Even if the technology is accessible and usable, the concern is the teachers' abilities and knowledge to integrate ICT in their T&L. Teacher digital competency becomes the forefront issue in this study since risks to students' learning process are disdain. This research explained the relationship between the pedagogical method, the information, and communication technologies (ICT) skills, and online teaching readiness among secondary school teachers in Malaysia. A descriptive and correlational study was employed to determine the level of teacher competency in three aspects: digital pedagogy, ICT skill, and online teaching readiness and the relationship among the aforementioned variables. One hundred and twenty-two teachers from selected high schools in Klang Valley were invited voluntarily to participate in the study. The validated questionnaire was uploaded in the google form and the link was distributed to teachers via email invitation. The results indicated the teacher's digital competency based on pedagogical approaches, ICT, and online teaching was ranked at a high level. It is important to note that there was a strong and positive relationship among the studied variables. The findings projected salient integration of the variables to inspire digital competency practices among teachers successfully.

Keywords: Pedagogical Method, Online Teaching, ICT, Teacher Digital Competency

1.   Introduction

Issues of deficiency of home-based learning (HbL) during the phase of COVID-19 is one of the most active discussions in the research today. The change in the teaching and learning (T&L) process is more difficult to allay with the concern of educational stakeholders about how susceptible the students are and how effective they learn. The Ministry of Education Malaysia (MOE) introduced HbL due to the absence of students attending school physically. Most importantly, students' safety and health are the top priority. HbL was applied to all levels of the school system in Malaysia. The ruling took place in 2020.

Educators must consider practical changes in T&L and understand what needs to be done at school to ensure the relevance of pedagogical approaches and ultimately assist students to embark on their potential. The rapid technology, vast information, and Industrial Revolution 4.0 have coerced the educational system into developing workforce-ready graduates for occupations that do not exist today (Ally, 2019). As technology evolves, inclusivity in education is promoted and manifested to provide effective instruction deliveries to encounter educational crises in the COVID-19

phase. Digital and innovation drive education transformation by accelerating connectivity and access to digital learning. The wide-awakens of technology awareness in the era of the pandemic have increased, hence educational stakeholders propel digitalization in T&L practices.

On another note, aspects to ensure HbL proceeds smoothly and efficiently must be placed on the central agenda. Worsen, accessibility to a stable Internet connection has become a major issue in teaching and learning via technology (Laksana, 2021). Therefore, a teacher must determine the best solution to this challenge. Myriad factors should be examined when it comes to effective HbL implementations. Teachers have been reminded to be wary of exercising necessary online pedagogical methods and skills as this would attenuate the HbL efficiency. Creative pedagogical strategies and ICT skills are integral elements to conduct HbL, thus retaining students' motivation and passion to learn are fortified. Teachers' knowledge disposition and teaching abilities must consider creative and innovative methods to ensure the HbL is well-delivered.

The COVID-19 outbreak in Malaysia has made instructors realize the value of digitalization. Due to the fact that teachers are still learning by using virtual education tools like Google Meet, Google Forms, Zoom, and Telegram voice chat brought a question on teachers' level of digital competency. Rusdiana et al. (2020) concocted that educators' lack of technological knowledge contributed to poor teaching deliveries to the students. Mazura and Wan Chu Wok (2018) similarly reported that 80% of teachers at schools lack an understanding of the best pedagogical approaches to cater to the needs of digitalization in teaching and learning settings. Despite employing diverse instructional approaches, teachers encounter difficulties in expanding their knowledge and skills of recent pedagogical strategies.
The findings also espoused teachers' challenges in updating knowledge and skills in using various teaching methods. Teacher acceptance and adoption of technology remain a struggling factor. Indeed, the unproficiency of technology use causes anxiety and depression among educational stakeholders (Alruwais et al., 2018). Teachers' work routine is not mainly for teaching, they are also upgrading technological knowledge and skills to attract students' interest and retention in virtual learning mode.

Another issue to consider is teachers' adoption of technology in the classroom. One of the main causes of this problem is that not all teachers are tech-savvy and are in dire need of specific training to use technology effectively (Alruwais et al., 2018). Teachers' daily routines involve more than just teaching in the classroom; they are required to concurrently update their technological knowledge and ICT skills to pique students' interest in the online learning environment. Unfortunately, Heggart and Yoo (2018) reported that heedless teachers believe the use of technology in online learning platforms does not warrant effective T&L. This condition places a great downside on HbL initiative. Undoubtedly, teachers have done whatever it takes to master the application and technological skills that are available to implement T&L although facing a lack of exposure to educational technology.

2.   Literature Review
In 21st-century academic contexts, conventional teaching methods which include chalk and talk, one-way conversation, and monotonous interaction are irrelevant and appear to be out of date (Omar et al., 2019). For this reason, teachers are requested to reassess their teaching methods and integrate digital tools in teaching as pedagogical methods. Kör et al. (2016) advised teachers to grab this opportunity by optimizing digitalization in their teaching strategies. Digital and technology integration in T&L has become a necessity at school as technology has evolved and been exposed to younger generations.

According to UNESCO (2017), digital skill plays a key role in advocating teachers' professionalism, especially transitioning from pre-service to in-service teachers. Digital competency, building technology capacities, and technology optimization should be considered in pedagogical practices. Teachers' digital literacy is crucial and needs to be addressed through a series of induction and training programs. Technological evolution, for instance, embarks the educational system to predicate human capital for future competitiveness in numerous domains, addressing present issues and developing new technologies (Malaysia, 2013). As a result, successful technology leaders must be well-trained and composed with digital knowledge and skills, as well as digital awareness to honor the ministry's mission.

The 21st-century educator demands instructional practices shift from teacher-centered to student-centered (Omar et al., 2019). Often, students value interaction, which includes ICT tools such as social and video communication applications, and flexibility in learning. To honor this request, educators should take proactive steps to improve their ICT skills (Kör et al., 2016). Previous research revealed hindrance factors towards ICT integration in the teaching and learning process. Lack of competency, low motivation, inferiority in using ICT tools, insufficient ICT equipment, and lack of commitment and strict regulation on using ICT tools at school were some of the reasons (Razak et al., 2019; Joo et al., 2018; López-Vargas et al., 2017; Balanskat et al., 2006; Brun & Hinostroza, 2014).

Because less effort into ICT participation and teachers' ignorance of the have caused lack of ICT skill training (Raman & Yamat, 2014). Ciptaningrum et al. (2015) described that ICT skills are predominantly by urban teachers. This condition was due to frequent exposure to ICT integration at school. Teachers' accessibility to ICT tools can incorporate

technology and digital tools in their T&L process whereas those teachers who teach in the rural area have a hard time to utilize which consequently contributed to a low level of ICT competency (Raman et al., 2019).

The capacity to utilize ICT is pivotal in the current school settings. It affects the growing experience as well as the students' advantages. Teachers ought to utilize suitable teaching procedures and strategies by utilizing different teaching tools to draw in and propel students to pick up their knowledge disposition (Mahad et al., 2021). Because T&L has become dull and unexciting, students disdain their presence at school. With regards to online learning, the utilization of ICT is a prerequisite for effective T&L.

Research by Downing and Dyment (2013) reported that; before online teaching, the majority of teachers in teacher preparation programs lack confidence and expertise in technology. Their perceived lack of technical or instructional skills was one of the causes of their inferiority. Four domains of online teaching competencies were identified by Martin et al. (2019a) as cited in Bolliger and Halupa (2022) to mitigate the issue. The first competency is course design, which encompasses facilitation, assessment, and pedagogy in the creation of material and instructional events. Interaction and communication make up the second competence. In addition to facilitating and taking part in discussions, instructors must give students quick responses and comments. Effective time management during the course's delivery is the third competency because it can take a lot of time to track students' progress and provide help for online learners. Technical knowledge, skills, and abilities on the platforms, systems, and instructional technologies that teachers must be able to use make up the fourth area of competency.

Because schools did not allow students to attend class to discuss the COVID-19 pandemic face to face at the time of the outbreak, all instruction was done online. One of the methods used is to hold video meetings using Google Meet, Zoom, Microsoft Team, and WebEx platforms. As a result, future educators will seek to include meeting programming in their classrooms. Most teachers, according to Kaviza (2020), use Google Classroom because it is a free platform provided by Google to assist educators in carrying out the growing experience and providing web-based assistance. Furthermore, using Google Classroom carefully, learning and assistance contact should be possible, especially in terms of time management. Tasks assigned to understudies are prepared, communicated, and evaluated.

The use of technology in education is becoming more common these days. It is amazing how light the educational environment can be, especially when dealing with more challenging circumstances and uncertainty. It is amazing how adaptable the educational environment can be, adding to the already challenging situations and sensitivity of a variety of things when it comes to providing training to individuals. As a result, the most promising method for involving the use of innovation in teaching is to ensure that the educator moves in lockstep with their ICT competence. The ability of educators to use ICT in teaching and learning environments is a critical component of ICT coordination (Agyei & Voogt, 2011). Therefore, it is hopeful to engage innovative strategies in T&L to warrant teachers' digital competency. Digital competency is a principal component of ICT coordination in instructing and learning settings (Agyei & Voogt, 2011).

Therefore, the overarching inquiry was to determine the extent of relationships among teachers' digital competency comprising three constructs: pedagogy, ICT skills, and online teaching readiness. Two research questions were formulated to guide this study: (a)what is the level of pedagogical competence, ICT skills, and online teaching readiness among secondary school teachers in Malaysia and (b) Are there any relationships between pedagogical methods, ICT skills, and online teaching readiness?

3.   Methodology

A quantitative descriptive and correlational study was employed to ascertain the research questions. A total sample of 122 respondents from Klang Valley secondary school teachers was involved in the study. The questionnaire form which was developed in Google Form was distributed through email and WhatsApp application. The researcher chose to use Google Form because it was easy to contact the sample. After all, the study was implemented during the phase of the Covid-19 pandemic causing constraints to be distributing the survey form physically. The researchers applied non-probability sampling techniques to select the sample from the population. Two stages of sampling techniques were applied. The first sampling technique involved convenience sampling which was then followed by the purposive. The language in the questionnaire questions is in English due to the ease of the respondents answering the questions and maintaining the original version of the survey. The questionnaire consisted of four sections. Questions related to demographic profiles were included in the first section. The second section contained 10 questions on pedagogical competency. Section C comprised 12 questions related to ICT skills, and section D comprised 16 questions on online teaching readiness. The total number of questions was 42 including four questions from the demographic section. The estimated duration to answer the survey was 20 minutes. The descriptive analysis and Pearson Correlation were employed to analyze the data. Pearson Correlation is used to study the correlation between the independent variables and the dependent variable. By determining the correlation between each other, the relationship between the variables can be identified as to whether there was any correlation among the studied variables.

4. Results

This chapter describes the results of the study which was conducted based on the objectives and research questions. From 150 questionnaires distributed to secondary school teachers, only 122 questionnaires were used for analysis. Thus, the participation rate of respondents was 81.3%. The data obtained includes data related to the demographics of the respondents consisting of gender, age, highest academic qualification, and race. This section also described the findings based on the formulated research question. The data obtained in this study were processed using Statistical Package for Social Science (SPSS) version 23. Table 1 described the demographic findings generated by the software:

Table 1 : Demographic profile.

Respondent background	Item	*f*	%
Gender	Male	55	45.1
	Female	67	54.9
Age	20-30	58	47.5
	31-40	16	13.1
	41-50	21	17.2
	51-60	27	22.1
Highest academic qualification	STPM	11	9.0
	Diploma	24	19.7
	Degree/ Bachelor	80	65.6
	Master	6	4.9
	PhD	1	0.8
Race	Malay	112	91.8
	Chinese	5	4.1
	Indian	3	2.5
	Others	2	1.6
Total		**122**	**100**

The distribution of study respondents in Table consisted of 55 male teachers, which was 45.1%, and 67 female teachers, which accumulated 54.9%. Most respondents aged 40 years and below piled up a total of 74 people (60.6%) whereas respondents 41 years and above were 48 (39.3%). Malays dominated with 112 (91.8%) followed by Chinese 5 (4.1%), Indians 3 (2.5%), and other races 2 (1.6%) respectively. Most respondents obtained bachelor's degree 80 (65.6%), followed by Diploma 24 (19.7%), STPM 11 (9.0%), Master (4.9%), and Ph.D. 1 (0.8 %).

Level of digital pedagogy, ICT skills, and online teaching readiness

Table 2 presents a descriptive analysis of the items in section B of the questionnaire focusing on digital pedagogy. Data obtained from the questionnaires were analyzed to report mean values and standard deviations for each item in the questionnaire form. The data showed that the cumulative mean was 3.97 with a standard deviation of 0.729. The item that obtained the highest mean was item B7, "I surf the internet to find teaching and learning resources" with a mean value of 4.07 with a standard deviation of 0.869. This finding is commensurate that the respondents of the study had a problem finding teaching materials on the Internet. Next, the second-highest item is item B6 "I am comfortable using a computer for learning activities" with a mean value of 4.06 with a standard deviation of 0.826. The item which obtained the lowest mean value was an item from B8 "I always apply computer and technology-based learning activities" with (M = 3.84) and (SD = .918).

Table 2 : Level of digital pedagogical

No.	Question	M	SD
B1	I know how to use technology that fits different teaching theories, approaches, and models	3.95	0.889
B2	I know how to apply ICT technology based on individual differences	3.94	0.856
B3	I know how to use technology when conducting assessments and evaluations (electronic portfolios, online tests, online rubrics, etc.)	3.87	0.927
B4	I know how to use technology in a way that positively affects learning	4.03	0.838
B5	I know how to use the materials and resources available online	4.02	0.853
B6	I am comfortable using a computer for learning activities	4.06	0.826
B7	I surf the internet to find teaching and learning resources	4.07	0.869
B8	I always apply computer and technology-based learning activities	3.84	0.918
B9	I like to use PowerPoint to present my teaching content	4.04	0.894
B10	I am good at using ICT tools.	3.85	0.933
	TOTAL	3.97	0.729

Table 3 provides a descriptive analysis of the items in section C of the questionnaire form focusing on the ICT competency. The findings reported the cumulative mean at 3.86 with a standard deviation of 0.821. The item with the highest mean was C1, "I am good at preparing notes using Microsoft Word" with a mean value of 4.24 with a standard deviation of 0.844. The second highest mean is followed by item C2 "I am good at preparing worksheets using Microsoft Word " (M= 4.13, SD= 0.953). Two items were found the least respectively: C8 "I am good at video editing" (M=3.53, SD= 1.137) and C11 "I am good at creating learning websites" (M=3.53, SD= 1.122).

Table 3 : Level of ICT skills

No.	Item	M	SD
C1	I am good at preparing notes using Microsoft Word	4.24	0.844
C2	I am good at preparing worksheets using Microsoft Word	4.13	0.953
C3	I am good at producing PowerPoint slides	4.09	0.900
C4	I am proficient in using Microsoft Office PowerPoint as a teaching aid	4.03	0.838
C5	I am proficient in using Microsoft Office Excel as a teaching aid	3.74	0.969
C6	I am skillful in producing interactive videos	3.65	1.034
C7	I am knowledgeable about types of multimedia for T&L	3.78	0.918
C8	I am good at video editing	3.53	1.137
C9	I am good at using interactive multimedia to make T&L more effective.	3.66	0.933
C10	I am good at searching for information via the internet	3.85	0.933
C11	I am good at creating learning websites	3.53	1.122
C12	I am good at using YouTube to engage students with learning content	3.86	1.039
	Total	3.86	0.821

Table 4 exhibits a descriptive analysis of the items in section D of the questionnaire form focusing on online teaching readiness. The findings reported the cumulative mean at 3.80 with a standard deviation of 0.814. The item with the highest meaning was D1, "I am able to teach students via online mode" with a mean value of 4.04 with a standard deviation of 0.844. The second highest mean is followed by item D2 "I equip myself with the ICT skills to teach online" (M= 3.98, SD= 0.862). The item which obtained the lowest mean value was an item from D14 "I am able to solve any problems related to computers" with (M = 3.44) and (SD = 1.045).

Table 4 :

No.	Item	Mean	S.D.
D1	I can teach students via online mode	4.04	0.894
D2	I equip myself with the ICT skills to teach online	3.98	0.862
D3	I can use a variety of technological equipment such as digital cameras, laptops, and video recorders **Level of Online Teaching Readiness**	3.84	0.927
D4	I can teach using the latest technological facilities	3.85	0.968
D5	I can lead my colleagues to use technology in teaching	3.84	0.921
D6	I set up a computer station to facilitate my student's learning needs	3.72	0.938
D7	I assist students using digital technology	3.86	0.965
D8	I equip myself with knowledge related to the computer-based teaching process	3.89	0.911
D9	I attend courses and training to increase my ICT knowledge	3.83	0.897
D10	I am ready to apply digital technology in my teaching activities	3.97	0.871
D11	I am confident to teach using ICT tools	3.83	0.985
D12	I have limited knowledge of using computer software for teaching and learning purposes	3.64	1.041
D13	I can do computer maintenance	3.49	1.173
D14	I can solve any problems related to computer	3.44	1.045
D15	I always use various types of multimedia (videos, pictures, presentation slides) in my teaching and learning process	3.81	0.982
D16	High ICT readiness increases self-confidence	3.89	0.925
	Total	3.80	0.814

Relationship between digital pedagogy, ICT skills, and online teaching readiness

The relationships among digital pedagogy, ICT skills, and online teaching readiness were examined using Pearson coefficient correlation analysis. According to the correlation analysis, there is a significant relationship and strong correlation between digital pedagogy and online teaching readiness at ($r = (122) = .87$, $p < 0.01$). The analysis also reported a strong and positive relationship between ICT skills and online teaching readiness at ($r = (122) = .901$, $p < 0.01$).

	Online Teaching Readiness		Interpretation
	r	*p*	
Digital Pedagogy	0.87	0.00	High and positively correlated
ICT skills	0.901	0.00	High and positively correlated

*Significant at p<0.01 (2-tailed)

5.   Discussion

The study investigated the relationship between pedagogy and ICT skills of the teachers and online teaching readiness. The result described most teachers are prepared with the online teaching readiness with the composition of suitable pedagogical approaches and ICT competence. The modernization of the education process is so rapid that the conventional T&L practices may become obsolete in the following years. Education experts have predicted that within a couple of years there will be flux with online learning and flexible learning. One of the challenges is to contend with teachers with the right teaching skills of whatever the technology is. The time is approaching when teachers' roles may be questioned of relevancy and responsibility to develop human capital.

The teacher must inveigh against the attempt to degrade teachers' profession by developing myriad competency traits and propagating the belief that coping with digital competency elements will result in a panacea for students' problems related to the academic problem and graduate competency for employment. The advancement in the pedagogical method by adopting technologies and digitalization warrants the necessity to advance ways of teaching by integrating into the society that we are living with. Teachers should figure out how to live and work within a community that has access to vast information from the internet due to digitalization (Chigona, 2018). They must predict the necessities of future dynamic communities of a globalized, digitized, intercultural, and changing society that requests a dynamic education system. Similarly, the pedagogical method (the ways of teaching), theoretical and practical information of the knowledge being taught, and innovative strategies from the optimization of technology as is proposed by the TPACK (Technology, Pedagogy, and Content Knowledge) model for the teachers of today (Koehler, Mishra, & Cain, 2013; Tourón et al, 2016),

is of substance in today's society.

With access to digitalization and industrial revolution 4.0, individuals and groups inevitably have the inherent right to propagate ideas and try to cope with challenges and struggles living in a society (Helsper, 2021). Therefore, teachers should play a major role in adopting creativity and innovative traits in teaching and learning procedures. Reflecting upon the idea of living in the post-Covid era, immersion in technology and digitalization have become a central role in academics. A teacher should be more flexible and open to technology use in teaching as teachers' digital competence is becoming a key element for the construction of useful pedagogical knowledge for practice and improvement of students' learning.

As digitalization has encultured in human nature, educators are compelled to re-examine and change past conventional teaching strategies by adopting them through innovation (Pettersson, 2018). The whole ecosystem of digitalization at school has made extensive requests for schools to develop competent educators who are not only computer-literate but also digital-literate to put forth high-quality teaching and learning experiences, most recently, attempts have been made to operationalize digital competency in a school setting (From, 2017; Howell 2012; Kivunja 2013; Krumsvik 2008, & Krumsvik et al. 2016). For example, Howell (2012) portrayed the digital pedagogy method as far as how teachers are capable of optimizing digital technologies in classroom procedures. Kivunja (2013), on another note, depicted digital pedagogy as 'the art of teaching, computer-driven digital technologies, which enrich learning, teaching, assessment and the whole curriculum' (p. 131). far as 'the craft of educating, PC driven computerized innovations, which enhance getting the hang of, instructing, appraisal and the entire educational plan' (p. 131). In another review, From (2017) put centers around educational perspectives as a particular quality of the more extensive term of digital competence. Discussing with an open mind digital competence is feasible and will explicate future teaching and learning strategies to inculcate inclusivity and meaning learning environment for students.

Quite often the use of technology propels the interactivity and engagement of students in instruction. As Lucas et al. (2021) pointed out the variety of teaching and learning tools will determine teachers; level of digital competency. The ecosystem of digitalization includes ease of use of the technology, confidence, and openness to technology becoming an essential factor to embark on digital learning initiatives (Ghomi & Redecker, 2019), in addition, espoused that teachers who are experienced in using technologies in class are digital competence teachers. To honor the spirit of digitally literate citizens with critical and creative skills, educators at all levels of education must not only be digitally competent themselves but also promote students' digital competence and take advantage of the potential of digital technologies for enhancing and innovating teaching. Equally important, educators should have a clear understanding of what critical competencies in this area are needed, as well as the pedagogical skills and knowhow to embed it across the teacher education curriculum, as digital practices in teacher education move away from specialized technology modules and into the mainstream (McGarr, & McDonagh, 2021).

6.   Conclusion

The research reported that most secondary school teachers possess a significant competency level of ICT and pedagogical skills in the online teaching model. On the other hand, they agreed to some extent that the readiness level for online teaching is somewhat promising. That being said, secondary school teachers in Malaysia are concerned about the current T&L situations due to the pandemic, and optimizing technology is one way to overcome the challenges. Teachers may have to fully equip themselves with online teaching skills due to uncertain challenges in the future. With this, high school teachers are prepared to implement online teaching without encountering any problems that will disrupt the process of learning. It is hoped that teachers keep their essence to abound with numerous technologies in teaching and be creative to adopt technologies in students' learning processes.

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