

Assessing the Level of Digital Literacy among selected Malaysian School Teachers

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Abstract. As a whole, focusing on digital literacy can enable teachers to educate students on how to utilize the opportunities offered by digital technology to enhance students critical thinking and creativity, and engage in their lives in ways that can make their learning more meaningful. Despite the fact that digital literacy continues to grow in importance as a crucial ability in education, a lack of digital literacy on the part of teaching staff is regarded as a genuine concern in preparing students for successful careers. Hence, the objective of the study to investigate how teachers perceive their digital literacy skills. The survey research approach was utilised to collect data through a self-administered questionnaire. The data was statistically analysed using descriptive analysis based on 356 valid responses. The findings revealed that Malaysian teachers believe that they have a high degree of digital literacy. Therefore, proper policymaking and planning for teachers on how to evaluate the quality of information in digital media, as well as improving their skills in identifying relevant information among the vast amount of available information by using the right search strategy, can help teachers achieve optimal digital literacy.

Keywords: Digital literacy, digital competence, innovative teaching, Malaysian school teacher, information management.

1 Introduction

The Industrial Revolution 4.0 (IR 4.0) has given educational transformation a new impetus. In recent years, education experts have recognised the profound impact of information and communication technology (ICT) on education (Haseeb, 2018). Thus, it can be agreed that emergence of Education 5.0 will be shaped by ICT along with the need to train students to produce creativity (Mirzajani et al., 2016). Some previous literature have agreed that digital literacy skills is one of teachers' compe-

tencies that could support creativity in teaching and learning process (Mohammadyari & Singh, 2015; Tang & Chaw, 2016). Tang and Chaw (2016) assumed that digital literacy is fast becoming a prerequisite for creativity, and entrepreneurship. This is in agreement with Avidov-ungar and Forkosh-baruch (2018) where digital literacy can contribute to school initiatives as well as supporting the development of subject knowledge in classrooms. As a holistic approach, a commitment to digital literacy can enable schools to support students in making the most of the opportunities associated with digital technology, develop young people's critical thinking and creativity, and engage in their lives in a way that has the potential to make their learning more relevant.

Nevertheless, lack of digital competence on the part of teaching staff is also considered a real issue in preparing students for successful careers, notwithstanding the fact that 'digital literacy continues to rise in importance in a key skill in every discipline and profession' (Hallam et al., 2018). As supported by Rambousek, Štípek, and Vaňková (2016), more than one-fifth of teachers do not consider their own digital competencies as sufficient for teaching. It affects the performance of daily tasks by teachers. Teachers become less creative in teaching because they are lack of skill in finding various sources of information that could support in diversifying the teaching techniques (Falloon, 2020). Therefore, this study was conducted to evaluate the level of digital literacy of selected Malaysian school teachers. In essence, the results of this study may help education institutions especially schools in recognising teachers' digital literacy by utilising the instrument from this study. Outcomes from this study will provide valuable insight to the government and policymakers in forecasting future development of educational institutions in Malaysia.

2 Literature Review

2.1 Digital Literacy

Gilster (1997) first coined the term 'digital literacy' in the late 1990s. He defined it in terms of education, recognising the Internet's fundamental but revolutionary uniqueness while defining digitally literate students as possessing a specific set of information abilities such as evaluating and searching, applying text and multimedia information found on the Internet, and situating them in a formal, school-based learning context. The definition has become highly contentious due to emerging innovations and new technology applications, many of which have been created through increasingly widespread Internet access and the proliferation of personal digital mobile devices. Several terms have been associated with digital literacy. For example 'information literacy' (Zurkowski, 1974), 'computer literacy' (Tsai, 2002), 'internet literacy' (Sáinz et al., 2008), 'media literacy' (Koltay, 2011), and recently, 'data literacy' (Carlson, 2016) have all been associated and promoted as components of an inclusive view of digital literacy (Falloon, 2020).

One of the definitions that encompasses the whole aspects is the definition by Martin and Grudziecki (2006). Digital literacy is defined as an individual's knowledge,

behaviour, and competence to use digital resources and materials accurately develop new idea, and connect with others in the aspects of behaviour and environment to empower life skills (Martin & Grudziecki, 2006). This definition concentrates on the use of digital tools and the skill of accessing information as well as how new knowledge can be produced. This definition also emphasises the ability to use digital technologies to generate meaning and communicate successfully with others, with the latter description mentioning clearly the ability to seek, appraise, and synthesise from digital resources (Ng, 2012). However, the term digital literacy is often used in a restricted meaning, denoting exclusively the effective use of ICT (Bidin et al., 2021). There are also inconsistencies in the use of the term. A distinctive feature of digital literacy was expressed by Koltay (2011) in which digital literacy touches on and includes many things that it does not claim to own. It encompasses the presentation of information, without subsuming creative writing and visualisation (Audrin & Audrin, 2022; Farias-Gaytan et al., 2023). It includes information evaluation but does not claim systematic review or meta-analysis as its own. It includes organisation of information but lays no claim to the construction and operation of terminologies, taxonomies, and thesauri (Tinmaz et al., 2022).

Through the above discussion, digital literacy is not limited to skills in searching, using, and managing digital information. In fact, it is also the ability to use digital tools wisely and effectively in accessing and evaluating information to fulfil daily information needs. The argument about the right definition of digital literacy is unabated due to many factors. Thus, in the context of this study, digital literacy refers to the skill, knowledge, and competencies of teachers to properly operate digital technologies and services to recognise, acquire, control, incorporate, analyse, and synthesise digital resources to support teaching and learning activities.

2.2 Dimensions of Digital Literacy

The majority of developed digital literacy models separate dimensions at each level or stage. Similarly, information literacy skills necessitate a person's proficiency at each stage of information seeking before they can fulfil their information needs on a daily basis (ACRL, 2000). However, Eshet-Alkalai (2004), and Khromov and Kameneva (2016) proposed that the term digital literacy encompasses several types of literacies, including media literacy and network literacy. As a result, the goal of this subsection is not to come up with a definitive explanation that covers all frameworks and models. Instead, it serves to examine a developed structure that is appropriate for teachers to define the extent to which they reflect the digital literacy's definition by Falloon (2020) in relation to the possibility of applications in education, or that has been scrutinised and documented in the context of education. The following discusses some of the most prominent frameworks.

The European Parliament and the Council produced Key Competences for Lifelong Learning in 2006, which included a framework. This framework is crucial to prepare the community towards complex needs, especially in the digital world. As such, Calvani et al. (2008) felt that this framework should reach the school environment. However, at that time, there was still no complete instrument to assess the level of digital

abilities of teachers and students as well as the means to promote this digital competence. Thus, Calvani et al. (2008) developed a digital competence framework. Calvani et al. (2008) adopted the term “digital competence” to be consistent with the European recommendation and also because the term “competence” is rapidly distributing in the educational language.

Digital Competence Framework by Calvani et al. (2008) emphasises three dimensions that represent three different levels: search for information, problem solving, and collaborative knowledge building. According to Tyger (2011) who referred to Calvani et al. (2008), digital literacy is able to flexibly explore and confront new technological circumstances, interpret, select, and critically evaluate data and information, leverage technological capacity to reflect and solve problems, and create mutual and collaborative knowledge, while fostering awareness of one’s own personal responsibilities and respect for obligations. Calvani et al. (2008) provide aspects that focus on technological, cognitive, and ethical levels. Integration of the three dimensions indicated above is possible, and it is based on a recognition of the opportunities provided by technology, which allows individuals to share information and collaborate to develop new knowledge.

Comparable to the framework developed by Calvani et al. (2008), the digital literacy framework developed by Ng (2012) is also three-dimensional namely technical, cognitive, and social-emotional. In contrast to Calvani et al. (2008), Ng (2012) perceives ethical as a part of cognitive and social-emotional. According to Miglbauer (2017), social-emotional suggested in this framework is the most complex type of digital literacy, which refers to the skills to “read” correctly the unwritten rules of human communication in cyberspace (spam, privacy issues, information sharing, collaborative working). Furthermore, with the existence of social media, one’s judgement in understanding information is worrisome (Ugboro & Obeng, 2001). Understanding that people behind the scenes authoring the material have their own goals and being able to critically evaluate whose voice is being heard and whose is not is vital for learning as neutrally as possible is central to all three components of the digital literacy framework. Referring to Ng (2012), critical literacy involves “ways of looking at written, visual, spoken, multimedia and performance texts to question and challenge the attitudes, values and beliefs that lie beneath the surface”. In order to appreciate the information's underlying importance, the individual must critically study digital resources in more depth. Figure 1 shows the concept and integration of those dimensions.

The digital literacy framework by Ng (2012) is seen to be very suitable for teachers' work environment. It also comprehensive and appropriate framework for the study on teachers. The other digital literacy frameworks are more focused towards the stages of seeking for information. In addition, the framework by Ng (2012) is very much in line with the daily tasks of teachers.

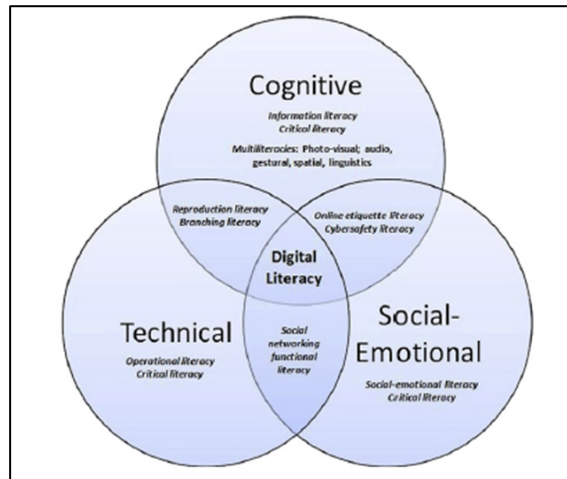


Figure 1: Digital Literacy Model by Ng (2012)

3 Methodology

To acquire the opinions of the respondents, this study used a descriptive quantitative design. To conduct the descriptive statistical analysis, the statistical software SPSS Version 26.0 been used. The respondents of this study consisted of 356 teachers from one type of schools in Malaysia and used convenience sampling, a method of nonprobability sampling for the collection of population samples. The population also diversified in demographic profiles like age, gender, grade, length of services and level of education. Seven-point Likert scale was used to collect the opinion of teachers. Each variables used the seven Likert levels from (1) Strongly Disagree until (7) Strongly Agree. For each item, the respondents were asked to rate their level of agreement or disagreement. Before being distributed to the intended respondents, the questionnaire was pre-tested by specialists, including two associate professors specialising in education and four school teachers with more than 10 years of experience. The questionnaire was altered as a result of their feedback and ideas. In addition, it was pilot tested with 43 school teachers, and the findings demonstrated that the measurement was sufficiently dependable.

4 Results

The demographic details of teachers were collected to know their background like gender, age, grade and level of education. The following table explains the demographic background of the respondents. In this study, 356 questionnaires were used. Out of 356 respondents, 96 (27%) of the respondents are male teachers and 260 (73%) are female teachers. The most dominant age of the respondents was between 30–39 years old (48.9%), followed by 40–49 years old (32.9%), and 21–29 years old (12.6%). Meanwhile, above 49 years old was 5.6% only. Teachers with grade DG44

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(n=155, 43.5%) represented the highest number recorded, followed by DG41 (n=142, 39.9%), DG48 (n=43, 12.1%), and DG52 (n=14, 3.9%). Meanwhile, only 0.6% (n=2) of teachers with grade DG54 answered the questionnaire. Based on the findings, most of the teachers involved in this study held Bachelor's Degree (n=304, 85.4%) followed by Master's Degree (n=51, 14.3%). Only 0.3% (n=1) of the respondents held a PhD. Table 1 indicates the demographic profile of the respondents.

Table 1: Demographic profile of the respondents

Demographic Profile		N (%)
Gender	Male	96 (27%)
	Female	260 (73%)
	TOTAL	356 (100%)
Age	21-29	45 (12.6%)
	30-39	174 (48.9%)
	40-49	117 (32.9%)
	>49	20 (5.6%)
	TOTAL	356 (100%)
Grade	DG41	142 (39.9%)
	DG44	155 (43.5%)
	DG48	43 (12.1%)
	DG52	14 (3.9%)
	DG54	2 (0.6%)
	TOTAL	356 (100%)
Level of Education	Bachelor's Degree	304 (85.4%)
	Master's Degree	51 (14.3%)
	Ph.D.	1 (0.3%)
	TOTAL	356 (100%)

Table 2 - 4 presents the results of the descriptive analysis of the digital literacy variables. Based on the rating scale of between 1 and 7, the mean score stood between 6.08 and 6.29 implying that the respondents have rated their level of digital literacy as high. Technical has the highest score followed by cognitive. Social-emotional even though ranked third, still scored a mean value above the mid value 4, hence indicating that these teachers agreed that their digital literacy skills are sufficient.

Table 2: Perceived Level of Technical

Items	Min	Max	Mean	Std. Error	Std. Dev	Var
1 I use digital technology and devices to support my teaching and learning	2.00	7.00	6.17	.037	.710	.505

2	I know how to solve technical problems related to my digital technology tools	3.00	7.00	5.89	.044	.833	.695
3	I keep up date with new digital tools and application use in teaching and learning	2.00	7.00	6.05	.047	.896	.803
4	I am familiar with the process of uploading, downloading and installing applications	2.00	7.00	6.17	.045	.867	.753
5	I can perform file management including deleting and renaming files, etc.	2.00	7.00	6.30	.044	.831	.692

Overall Mean Score for Technical **6.29**

N = 356

1 = Strongly Disagree; 2 = Disagree; 3 = Sometimes Disagree; 4 = Neutral; 5 = Sometimes Agree; 6 = Agree; 7 = Strongly Agree

Table 3: Perceived Level of Cognitive

Items	Min	Max	Mean	Std. Error	Std. Dev	Var
6 I am familiar with the online resources such as websites and online databases	2.00	7.00	6.24	.043	.828	.687
7 I browse, search and filter the information and digital content from websites and online databases	2.00	7.00	6.17	.048	.912	.833
8 I know when to change my search strategy or stop searching when using websites and online databases	2.00	7.00	6.09	.046	.877	.771
9 I evaluate whether digital information is credible and trustworthy before use it	2.00	7.00	6.08	.041	.781	.610
10 I can integrate information that comes from different online sources	2.00	7.00	5.96	.044	.836	.700
11 I keep a record on relevant details of digital information that are found online	2.00	7.00	6.05	.043	.825	.682

Overall Mean Score for Cognitive **6.09**

N = 356

1 = Strongly Disagree; 2 = Disagree; 3 = Sometimes Disagree; 4 = Neutral; 5 = Sometimes Agree; 6 = Agree; 7 = Strongly Agree

Table 4: Perceived Level of Social-Emotional

Items	Min	Max	Mean	Std. Error	Std. Dev	Var
12 I acknowledge who owns information and ideas that I find online	3.00	7.00	6.18	.046	.881	.777
13 I avoid plagiarism	1.00	7.00	6.26	.047	.900	.812
14 I share files such as documents, video and audio legally with others	3.00	7.00	6.18	.046	.870	.758
15 I communicate with others via online such as forums, social networking, blogs, etc.	1.00	7.00	6.03	.056	1.056	1.117
16 I comment on social media, blogs, forums or websites	1.00	7.00	5.79	.060	1.140	1.300
17 I observe etiquette and appropriate social conventions for online communication	3.00	7.00	6.07	.048	.911	.832
Overall Mean Score for Social-Emotional			6.08			

N = 356

1 = Strongly Disagree; 2 = Disagree; 3 = Sometimes Disagree; 4 = Neutral; 5 = Sometimes Agree; 6 = Agree; 7 = Strongly Agree

5 Discussion

Digital literacy is a critical component of enabling teachers in their educational activities in the age of information technology. Teachers play a dominant role in students' digital literacy since of their direct or indirect function in education; thus, a sufficient level of digital literacy among teachers will have a substantial impact on enhancing students' digital literacy.

By looking at the technical part, the teachers are totally capable to handle digital tools in their daily tasks especially teaching and learning. Most of them use digital tools or devices and software to search information for teaching materials. This finding is aligned with Falloon (2020) in which teachers participate in various workshops to equip themselves with technology skills specifically on how to use devices and software. This is supported by Samsudin (2018) where most of the teachers have attended training on learning tools for digital classroom. They also use a variety of applications on the Internet that can be downloaded such as Zipgrade, Kahoot, and Plickers in their respective teaching subjects, manage teaching files, and update Human Resource Management Information System (HRMIS). Therefore, the numbers of workshops and programmes to strengthen teachers' digital skills need to be increased due to their positive impact on teaching methods.

Apart from technical, teachers were measured on cognitive. It is no doubt that teachers are able to search, evaluate, select, and use potential sources of information

for their teaching and learning. According to Falloon (2020), teachers have been taught to evaluate information for a range of curriculum and teaching purposes, and the type of thinking associated with this, for example analysis, evaluation, and critical thinking. This is important to ensure that teachers use efficient and time-saving methods as well as obtaining accurate information. This finding is also aligned with the data from preliminary study where teachers refer to previous research from online databases such as Emerald Insight, Ebscohost, and Springer provided by MARA Knowledge Centre (Samsudin, 2018). This helps them to prepare complete and good lesson plans.

The last dimension to measure digital literacy is social-emotional. Compared to technical and cognitive, the overall mean for social-emotional was slightly lower. However, based on the mean score, it is no doubt that teachers use digital tools responsibly and prudently. It can be seen that most teachers avoid plagiarism because they acknowledge the owners of information and ideas found online. This finding is aligned with Hague and Payton (2010) where teachers need to understand plagiarism to teach students to avoid it. The finding also shows that teachers maintain good manners in online communication. However, according to Ng (2012), this does not limit the use of digital tools by teachers. Teachers need to be given the opportunity to get involved with the aim of adopting digital tools and using them to create meaningful ideas or products with minimal fuss.

6 Conclusion

The purpose of this research is to assess the level of digital literacy among a group of Malaysian teachers. It can be inferred that digital literacy encompasses more than only the ability to find, use, and manage digital information. In fact, it is also the ability to obtain and evaluate information using digital tools intelligently and effectively to meet daily information needs. Three dimensions of digital literacy were measured. The first dimension is technical, second is cognitive and third is social-emotional. The findings show that technical has the highest score followed by cognitive. Social-emotional even though ranked third, still scored a mean value above the mid value 4, hence indicating that these teachers agreed that their digital literacy skills are sufficient. In essence, the results of this study may help education institutions especially schools in recognising teachers' digital literacy by utilising the instrument from this study. Outcomes from this study will provide valuable insight to the government and policymakers in forecasting future development of educational institutions in Malaysia.

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