Teachers' Use of Technology: Examining the Domains of Laptop Competence

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Abstract

INTRODUCTION: The current coronavirus pandemic has forced the transition from face-to-face teaching and learning to fully online in Malaysia.
OBJECTIVES: To examine the domains of laptop competence and its relationship with laptop use among teachers.
METHODS: A quantitative descriptive survey design using questionnaires involved 133 Mathematics and Science secondary school teachers.
RESULTS: Based on the results, the teachers are highly competent in word processor; basic laptop operation skills; telecommunication; spreadsheet; multimedia integration; and setup, maintenance, and troubleshooting of laptop but only moderately competent in media communication; and database. There was a significant positive relationship between teachers' laptop competence and laptop use.
CONCLUSION: Act as a guide to plan effectual training according to the needs of the teachers based on each item of the domains outlined to promote more rigorous use of laptops among the teachers.

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1. Introduction

Vision 2020 is Malaysia's aim of becoming a competitive key player in the worldwide economy (Ministry of Education, 2013; Vighnarajah, Luan, & Bakar, 2009; Wong & Hanafi, 2007). In line with the nation's drive to fulfil Vision 2020, Malaysia intends to transform its educational system simultaneously with Education Development Master Plan and Malaysia's National Philosophy of Education to develop holistically the potential within the individuals. Koo (2008) noted that Information Communication and Technology (ICT) is a powerful tool that can act as a channel to achieve the aforesaid aims. Therefore, the catalyst for this enormous transformation will be ICT (Afshari, Bakar, Luan, Afshari, Fooi, & Samah, 2010; Ayanso, Cho, & Lertwachara, 2014) as Malaysia intends to transform its education system to produce critical individuals and capable decision makers to meet the challenges of the technological world (Islim & Cirak, 2017; Kumar, Osman, & Pranchis, 2018; Ministry of Education, 2013; Ziden, Fook, Hoong, & Rahman, 2017).

The current coronavirus pandemic has forced the transition from face-to-face teaching and learning to fully online learning in some countries such as Malaysia. Sahu (2020) revealed that many educators were not able to cope with the "emergency remote teaching" (ERT). According to Yew and Tan (2020), the term "ERT" was introduced to describe the sudden switch of teaching mode to solely online during the pandemic outbreak, and the differences between ERT and well-planned online learning were highlighted. The recent findings of Yew and Tan (2020) suggested that ICT competency was strongly correlated with teachers' behavioural intentions in adopting educational technologies in their teaching. Although

education in Malaysia started to be revamped with e-learning in the early 21st century, not all in-service teachers were well exposed to ICT knowledge during their teacher training program (Yew & Tan, 2020).

Undeniably, laptops are seen as a tool for seamless ICT integration into the learning environment anytime and anywhere. Laptops provide greater mobility and ease of transition for the teachers to carry out their lessons. Teachers, therefore, need to be competent to use and manage laptops for their teaching-learning process. Studies have found competence as one of the important antecedents that can influence the teachers' technology use (Baturay, Gökçearslan, & Ke, 2017; Kretschmann, 2015). Similarly, Moses, Khambari, and Luan (2008) and Almerich, Orellana, Suárez-Rodríguez, and Díaz-García (2016) reported that one of the factors that affect the use of laptops among the educators is laptop competence. Matters corresponding to ICT incorporation into curriculum include technology competence, and the lack of it may result in difficulties to teach effectively (Ministry of Education, 2013; Ottestad, Kelentrić, & Guðmundsdóttir, 2014). A study done by Kristiawan (2014) found that secondary school teachers could not use technology to facilitate their teaching practices. The score obtained from Kristiawan (2014) showed that teachers' competence in using technology for instruction was poor.

Competency is noted by Raven (1984) as the "motived pattern" which includes extended skills, knowledge, and abilities to perform a valued task. Technology competency occurs as the users face the challenges of proficiently utilising the learning tools to develop their skills (Ishak, Rahim, & Osman, 2007). Ottestad et al. (2014) suggested that digital competence relates to hardware and software management and digital knowledge and education. They further explained that teachers' digital competence refers to teachers' choices on the type of digital tools used in teaching and how they are used (Ottestad et al., 2014). In a study on developing a competency model for secondary school computer science teachers, competency was defined as performance dispositions to resolve complicated situations (Margaritis et al., 2015). Flowers and Algozzine (2000) employ a deeper meaning of competence, ranging from handling basic computer operations; setup, maintenance, and troubleshooting; word processing; spreadsheet; database; networking; telecommunication; media communication; to understanding social legal, and ethical issues. This study classifies laptop competence as the teacher's self-reported perceived skill and knowledge in using laptops to perform essential functions such as handling basic laptop operation; setup, maintenance, and troubleshooting; word processing; spreadsheet; database; telecommunication; media communication; and multimedia integration.

Previous studies have been conducted in the Malaysian context concerning the use of ICT among teachers. For example, Masood and Ngah (2007) investigated ICT utilisation among secondary school teachers in the Northern Region. Respondents were 648 teachers from 44 secondary schools. According to the findings, the teachers primarily used word processing (81.5%), presentation slides (73.0%), spreadsheet (60.4%), search engine (51.0%) and electronic mail (40.2%). Masood and Ngah (2007) also reported that the teachers can integrate Computer Assisted Instruction, word processing and presentation slides effectively compared to other features.

Moreover, several previous studies have also been carried out in regard to teachers' ICT competency. According to Baturay et al.'s (2017) study carried out in Turkey, there is a positive significant relationship between pre-service teachers' computer competence, attitude towards computer-assisted education and intention to technology acceptance. In Malaysia, Raman and Shariff (2017) studied the relationship between technology leadership, ICT facilities, competence, commitment, and teachers' technology use with effective teacher's management tasks in schools. The respondents of the quantitative study were 370 secondary school teachers. According to the research findings, there is a positive relationship between technology leadership, ICT facilities, competence, and commitment of teachers to adopt ICT and the effectiveness of management duties of teachers using ICT in school.

Mahmud, Ismail, Sahid, and Yazid (2007) conducted a survey among 88 teachers in the district of Hulu Langat, Selangor. The teachers involved were 18 male and 70 female teachers from both primary and secondary schools. Questionnaires and interviews were used to collect the data from the respondents. The study's main aim was to determine the teachers' level of knowledge, skills, and attitude in integrating ICT into the teaching-learning environment. The findings revealed that the level of ICT knowledge and skills among the teachers in the district were low. However, these teachers have positive attitude to implement ICT in the teaching-learning process to enhance learning activities.

Besides that, Sa'ari, Wong, and Roslan (2005) carried out a study to measure the in-service teachers' perceived competence toward technology using survey questionnaires. These in-service teachers were from three districts in Malacca which consisted of 132 female and 66 male teachers. The respondents had a moderate level of competence in utilising spreadsheet (51.9%), word processing (48.1%), basic computer operation skills (43.1%) and telecommunication (43.1%). However, most of the teachers had a low level of competence in using media communication (57.5%). In general, the overall competency levels towards technology among the 160 in-service teachers were found to be at a moderate level.

Other similar studies, such as a quantitative survey research were conducted by Alias (2004) among 181 in-service teachers in Sarawak to measure their technology competency. The competence aspect was divided into three categories: skill, knowledge, and training among the teachers. Alias reported that the teachers' levels of competence in all the aspects were at the moderate level (2004). Hence, these teachers need to be equipped with wide-ranging knowledge, skills, and training of

technology competence to be highly competent in handling the ICT devices.

Besides that, Zakaria, Aris, and Harun (2007) explored ICT skills among the pre-service teachers in Universiti Teknologi Malaysia, Johor. Pre-service teachers involved in the study were 379 in total; 89 males and 289 females. Based on the results, it was found that these teachers were highly competent in integrating ICT skills. Word processing and presentation software had the highest mean scores among the pre-service teachers compared to handling hardware operation and troubleshooting hardware/software problems. Zakaria et al. (2007) stated that pre-service teachers' ICT skills are high as these two applications (word processing and presentation) are essential software used for their daily tasks.

Lau and Sim (2008) carried out a study to explore ICT adoption among secondary school Mathematics and Science in Malaysia. One of the objectives was to determine the teachers' ICT competency. Competency was measured using a five-point Likert scale questionnaire from no capability (1), low capability (2), fair (3), good (4), to excellent (5). The examined domains of competency were word processing, presentation tools, spreadsheet, teaching courseware, statistical tools, e-mailing and internal browsing. These teachers indicated that they are competent (good or excellent) in utilising word processing (71%), teaching courseware (63%), and presentation tools (50%). Lau and Sim suggested that these teachers' competency is most likely related to their frequent usage of the applications in presenting the lessons and preparing the teaching aids. At the same time, they perceived themselves to be generally good or moderately competent in using internet browsing (47%), emailing (41%) and spreadsheet (39%). According to Lau and Sim, these applications are not constantly used by the teachers in their daily instruction and teaching. For example, spreadsheets are usually only used to manage the students' results. The findings also revealed that these teachers considered themselves least competent in handling statistical tools (31%) compared to the other applications.

As a whole, it can be concluded that one of the key factors that influence the utilisation of the ICT tools is the teacher's technology competence. The review of literature has shown that the level of competence among the teachers is inconsistent and contradicting. The studies done depicted that the level of competence is either low (Mahmud et al., 2007), moderate (Sa'ari et al., 2005; Alias, 2004), or high (Zakaria et al., 2007) among the teachers in Malaysia. As for this study, laptop competence is a skill and knowledge that teachers need to acquire to utilise the laptop proficiently for instructional purposes. Therefore, teachers need to be equipped with the latest ICT knowledge and skills in all aspects of the instructional process. This includes being competent in using the laptops to play an effective role as the facilitators in the learning environment, especially during the pandemic.

Teachers need to be ICT competent in order to be able to integrate the laptops effectively. Thus far, as shown in the literature review, many studies have focused mainly on teachers' computer competency. Not many studies have explored teachers' laptop competence. According to Guillén-Gámez et al. (2020), the different dimensions should be considered to measure teachers' digital competence. For these reasons, this study is essential in contributing to the laptop competence literature gap that exists within the scope of laptop integration in Malaysian. The objective of this study, therefore, is to examine the domains of laptop competence, and the relationship between laptop competence and laptop use among the secondary school teachers. Aptly, this study seeks to find answers for these overarching questions: 1) Are the teachers competent to utilise the laptops for instructional purposes — in handling basic laptop operation; setup, maintenance, and troubleshooting; word processing; spreadsheet; database; telecommunication; media communication; and multimedia integration? 2) Is there a significant relationship between teachers' laptop competence and laptop use?

2. Methodology

A quantitative descriptive research design was used in this study. Quantitative descriptive study involves accumulating data in order to respond to questions about the current status of the subject or topic of the investigation (Cohen, Manion, & Morrison, 2011; Kumar, 2014; Punch, 2013). According to Lodico, Spaulding, and Voegtle (2006), one of the common characteristics of a descriptive survey is that the sample is chosen from a large population to generalise the findings. Hence, questionnaires were used to collect data concerning the perceived competence of the teachers.

The North Carolina Educational Technology Competency Standards (Chapman & Sneeden, n.d.) served as the main resource to the researchers to develop the items for the survey. Based on the most common types of productivity tools used by the teachers for teaching-learning purposes (Wong, 2002), eight domains were identified by the researchers. The items developed focused on the common usage of laptops among the teachers: basic laptop operation skills; setup, maintenance, and troubleshooting; word processing; spreadsheet; database; telecommunication; media communication; and multimedia integration. Table 1 displays the eight domains of laptop competence and the number of items in each domain.

Laptop competence was measured in terms of four different competence capabilities using a four-point Likert scale. Description used by Flowers and Algozzine (2000) for technology competencies ranging from "Not able to perform the task" to "Able to teach others how to perform the task" was adapted by the researchers. These items were scored as 1 point - "Not able to perform the task", 2 points - "Able to perform the task with some assistance",

3 points - "Able to perform the task without assistance" and 4 points - "Able to teach others how to perform the task".

The laptop use scale was developed by the researchers based on the review of the literature. The scale was quantified, ranging from "Never" – 1 point, "Once in a while" – 2 points, "Sometimes" – 3 points, "Often" – 4 points, and "Very often" – 5 points.

Table 1. Content Specification for Laptop Competence and Laptop Use Scales

Domains	Number of Items
Laptop Competence Scale	56
Basic Laptop Operation Skills	9
Setup, Maintenance, and Troubleshooting	6
Word Processing	8
Spreadsheet	5
Database	8
Telecommunication	7
Media Communication	6
Multimedia Integration	7
Laptop Use Scale	11

The questionnaire was content validated by a panel of expert judges consisting of four experts from Universiti Putra Malaysia, Universiti Sains Malaysia, Universiti Teknologi Malaysia, and Multimedia University. Approval was then obtained from the Educational Planning and Research Division, Ministry of Education and the Federal Territory of Kuala Lumpur Education Department to carry out the study. The data collection process took about two months. The researchers sought the assistance of the Heads of Mathematics and Science subjects in the schools to collect the data. The researchers explained the purpose of the study to the heads, and they helped to distribute the questionnaires to the teachers. It took approximately 10 minutes for the respondents to complete the questionnaire. A total of 35 Mathematics and Science secondary school teachers participated in the pilot study and the Cronbach's alpha value for both the scales were above .70. For the actual study, 133 teachers participated and the alpha coefficient for the laptop competence subscales ranged from .90 to .99 (Table 2). The alpha coefficients of each of the domains are as follows: basic laptop operation skills (.95); setup, maintenance, and troubleshooting (.90); word processing (.97); spreadsheet (.92); database (.99);

telecommunication (.95); media communication (.92); and multimedia integration (.96). The alpha coefficient of laptop use scale scored 0.95. The alpha values suggested that the instrument has high internal consistency.

Table 2. Alpha Coefficients Value of Laptop Competence Scale

Domains	Reliability (Cronbach's Alpha) Coefficient)
Basic Laptop Operation Skills	.95
Setup, Maintenance, and Troubleshooting	.90
Word Processing	.97
Spreadsheet	.92
Database	.99
Telecommunication	.95
Media Communication	.92
Multimedia Integration	.96

The researchers carried out a conversion of data to illustrate and explain the result of the study. The data were transformed consecutively to report on the levels of each domain in the laptop competence. The scores were quantified using the mean scores (summation of scores divided by the number of items). Therefore, the maximum possible mean score is 4.00 whereas the minimum mean score is 1.00. The difference between the maximum and minimum mean scores is divided by three to equally cluster the mean into three different competence levels namely low, moderate, and high (Table 3).

Table 3. Alpha Coefficients Value of Laptop Competence Scale

Category of Scores	Competence Level
Below 2.00	Low
Between 2.00 and 3.00	Moderate
Above 3.00	High

3. Results

3.1. Demographic Information of the Teachers

Respondents who participated in this study were 122 female teachers (91.7%) and 11 male teachers (8.3%). These teachers have less than a year to 28 years' experience working as secondary school teachers. Their ages varied from 23 to 54 years (M = 33.05, S.D. = 7.65). A total of 68 (51.1%) teachers have less than five years of experience using the laptop, and the remaining teachers have more than five years of experience utilising the laptop for instructional purposes. According to the responses given by the teachers, more than half of them (61.7%) have attended training on how to incorporate ICT into the instructional practices.

3.2. Findings of the study

The findings of this study concerning the teachers' laptop competence were reported according to the eight domains — basic laptop operation skills; setup, maintenance, and troubleshooting; word processing; spreadsheet; database; telecommunication; media communication; and multimedia integration in the following subsections.

Basic laptop operation

This subsection reports on the competence of basic laptop operation skills among the teachers (Table 4). This domain contains 9 items. Most of the teachers are able to teach others how to handle basic laptop operation skills. This is because more than 60% of the teachers reported that they are able to teach others how to perform the task particularly in all the items in the basic laptop operation skills. Only two items reported that less than 60% of the teachers are able to teach others, namely "Work with more than one application at a time on the laptop" (n=79, 59.4%) and "Install software into the laptop" (n=69, 51.9%).

The competence level of basic operation skills of laptop among the teachers was found to be high (M = 3.60, S.D. = 0.52). Seven items scored above the overall mean for basic laptop operation skills. Two items -- "Operate the laptop" and "Operate a USB drive" scored the highest mean (3.68) with a standard deviation of 0.51 and 0.48. Meanwhile, the "Install software into the laptop" item scored the lowest mean with the value of 3.29 (S.D. = 0.83).

Table 4. Descriptive Statistics for Items on Basic Laptop Operation Skills

Item	Not able to perform the task F (%)	Able to perform the task with some assistance F (%)	Able to perform the task without assistance F (%)	Able to teach others how to perform the task F (%)	Mean	Std. Deviation
Operate the laptop (e.g: start up, shut down etc.)	0 (0)	3 (2.3)	36 (27.1)	94 (70.7)	3.68	.51
Print using the laptop.	1 (0.8)	2 (1.5)	40 (30.1)	90 (67.7)	3.65	.55
Run a CD in the laptop (e.g: insert, eject etc.)	0 (0)	5 (3.8)	38 (28.6)	90 (67.7)	3.64	.56
Operate a USB drive (e.g.: pendrive, thumbdrive etc.) in the laptop.	0 (0)	1 (0.8)	40 (30.1)	92 (69.2)	3.68	.48
Create folders in the laptop.	1 (0.8)	5 (3.8)	35 (26.3)	92 (69.2)	3.64	.60
Name folders in the laptop.	1 (0.8)	4 (3.0)	34 (25.6)	94 (70.7)	3.66	.58
Rename folders in the laptop.	1 (0.8)	4 (3.0)	36 (27.1)	92 (69.2)	3.65	.58
Work with more than one application at a time on the laptop.	1 (0.8)	11 (8.3)	42 (31.6)	79 (59.4)	3.50	.68
Install software into the laptop.	2 (1.5)	26 (19.5)	36 (27.1)	69 (51.9)	3.29	.83

Overall Mean for Basic Laptop Operation Skills: 3.60; Standard. Deviation: 0.52

Setup, maintenance, and troubleshooting

This domain reports on the setup, maintenance and troubleshooting of the laptop among the teachers (Table 5). Nearly 42.9% of teachers stated that they need some assistance to troubleshoot the common laptop hardware problems. About 36.8% reported that they are able to perform the task without assistance on how to connect a video output device such as LCD panel to the laptop for larger screen display. Less than half of the teachers are able to teach others how to connect devices such as battery charger, external modem or webcam to the laptop (48.1%); scan the laptop for protection against viruses (45.1%); make backup copies of files in the laptop (41.4%); and Install antivirus into the laptop (32.3%).

The teachers' laptop competence of setup, maintenance and troubleshooting was at the borderline of high competence level (M = 3.01, S.D. = 0.72). Out of the six items, four items scored above the overall mean for setup, maintenance, and troubleshooting. The item with the lowest mean score was "Use self-help resources to diagnose common hardware problems (e.g.: troubleshooting etc.) in the laptop" with the value of 2.48 (S.D. = 0.92) and the highest mean score was 3.25 (S.D. = 0.82) for the item "Scan the laptop for protection against viruses."

Table 5. Descriptive Statistics for Items on Setup, Maintenance, and Troubleshooting

Item	Not able to perform the task F (%)	Able to perform the task with some assistance F (%)	Able to perform the task without assistance F (%)	Able to teach others how to perform the task F (%)	M	S.D.
Connect devices (e.g.: battery charger, external modem, webcam etc.)	5 (3.8)	26 (19.5)	38 (28.6)	64 (48.1)	3.21	0.89
Connect a video output device (e.g.: LCD panel etc.) to the laptop for a larger screen display.	2 (1.5)	35 (26.3)	49 (36.8)	47 (35.3)	3.06	0.82
Make backup copies of files in the laptop.	6 (4.5)	21 (15.8)	51 (38.3)	55 (41.4)	3.17	0.85
Use self-help resources to diagnose common hardware problems (e.g.: troubleshooting etc.) in the laptop.	17 (12.8)	57 (42.9)	37 (27.8)	22 (16.5)	2.48	0.92
Install antivirus into the laptop.	10 (7.5)	39 (29.3)	41 (30.8)	43 (32.3)	2.88	0.95
Scan the laptop for protection against viruses.	5 (3.8)	17 (12.8)	51 (38.3)	60 (45.1)	3.25	0.82

Overall Mean for Setup, Maintenance, and Troubleshooting: 3.01; Standard Deviation: 0.72

Word processing

This subsection measures the teachers' skills of using word processing in the laptop. The information in Table 6 portrays that the majority of the teachers (> than 50%) can teach others how to use word processing. The teachers who stated that they can teach others to change text format scored the highest percentage (73.7%), and almost one third of the teachers reported that they can perform any task without assistance while using word processing.

The level of laptop competence in terms of word processing among the teachers is high (M= 3.62; S.D. = 0.55). Five out of eight items scored equal and above the overall mean for the usage of word processing in the laptop. The statement "Check grammar in a word document" scored the lowest among all the items with a mean value of 3.50 (S.D. = 0.68) and the item "Change text format" with the highest percentage again scored the highest mean score of 3.71 with the standard deviation of 0.53.

Table 6. Descriptive Statistics for Items on Word Processing

Item	Not able to perform the task F (%)	Able to perform the task with some assistance F (%)	Able to perform the task without assistance F (%)	Able to teach others how to perform the task F (%)	M	S.D.
Change text format (e.g.: font, size etc.).	1 (0.8)	2 (1.5)	32 (24.1)	98 (73.7)	3.71	0.53
Set margin.	1 (0.8)	2 (1.5)	44 (33.1)	86 (64.7)	3.62	0.56
Set line spacing (e.g.: single, double spacing etc.).	1 (0.8)	2 (1.5)	37 (27.8)	93 (69.9)	3.67	0.55
Check spelling in a word document.	1 (0.8)	8 (6.0)	42 (31.6)	82 (61.7)	3.54	0.65
Check grammar in a word document.	1 (0.8)	11 (8.3)	42 (31.6)	79 (59.4)	3.50	0.68
Insert header/footer.	1 (0.8)	9 (6.8)	34 (25.6)	89 (66.9)	3.59	0.65
Insert page numbers into a word document.	1 (0.8)	4 (3.0)	38 (28.6)	90 (67.7)	3.63	0.58
Create table(s) in a word document.	1 (0.8)	3 (2.3)	34 (25.6)	95 (71.4)	3.68	0.56

Overall Mean for Word Processor: 3.62; Standard Deviation: 0.55

Spreadsheet

This subsection measures the teachers' skills of using spreadsheet in the laptop (Table 7). Generally, more than half of the teachers stated they could teach others how to create a spreadsheet with table(s) using rows and columns (56.4%), and also edit cells by adding borders or shading in spreadsheet (54.9%). One-third of the teachers indicated that they could teach others how to insert formulas manually to perform a calculation (35.3%). However, 33.8% of the teachers reported needing assistance to insert formulas using a function to calculate in the spreadsheet. The percentage of teachers who can create charts such as graphs and pie charts without assistance is 38.3%.

The teachers' laptop competence in terms of using a spreadsheet can be categorised as high with the mean value of 3.15 (S.D. = 0.72). There were only two items that scored above the overall mean - "Create a spreadsheet with table(s) (using rows and columns)" and "Edit cells (e.g.: borders, shading etc.)". The item with the lowest mean was "Insert formula by using a function to perform calculation" with the value of 2.85 (S.D. = 0.91).

Table 7. Descriptive Statistics for Items on Spreadsheet.

Item	Not able to perform the task F (%)	Able to perform the task with some assistance F (%)	Able to perform the task without assistance F (%)	Able to teach others how to perform the task F (%)	M	S.D.
Create a spreadsheet with table(s) (using rows and columns).	1 (0.8)	8 (6.0)	49 (36.8)	75 (56.4)	3.49	.65
Edit cells (e.g.: borders, shading etc.).	2 (1.5)	16 (12.0)	42 (31.6)	73 (54.9)	3.40	.76
Insert formula manually to perform calculation.	5 (3.8)	39 (29.3)	42 (31.6)	47 (35.3)	2.98	.90
Insert formula by using function to perform calculation.	7 (5.3)	45 (33.8)	42 (31.6)	39 (29.3)	2.85	.91
Create chart(s) in a spreadsheet (e.g.: graph, pie chart etc.).	7 (5.3)	27 (20.3)	51 (38.3)	48 (36.1)	3.05	.88

Overall Mean for Spreadsheet: 3.15; Standard Deviation: 0.72

Databases

Table 8 illustrates the findings of teachers' laptop competence in terms of database. The results obtained from the questionnaires found for all the items shown in Table 8, the majority of the teachers, between 42.9% and 50.4%, can only perform tasks in the database with some assistance from others. These teachers can create a database without using the database wizard (50.4%), create query(s) in a database (49.6%), define the primary key of a table (47.4%), define relationships between the tables (46.6%), create forms (46.6%), create a database using the database wizard (45.1%), create reports (45.1%), and create tables (42.9%) in database with some assistance. Based on each of the items, less than 10% of the teachers reported that they are able to teach others how to perform the task in the database.

The laptop competence for database domain among the teachers was found to be at moderate level, with the mean value of 2.03 (S.D. = 0.82). Out of eight items, four items scored equal and above the overall mean. The statement that scored the lowest with a mean value of 1.95 (S.D. = 0.80) was "Create query(s) in a database" and the item with the highest mean was "Create table(s) in a database." (M = 2.12, S.D. = 0.89).

Table 8. Descriptive Statistics for Items on Databases

Item	Not able to perform the task F (%)	Able to perform the task with some assistance F (%)	Able to perform the task without assistance F (%)	Able to teach others how to perform the task F (%)	Mean	Std. Deviation
Create a database using the database wizard.	39 (29.3)	60 (45.1)	24 (18.0)	10 (7.5)	2.04	.88
Create a database without using the database wizard.	39 (29.3)	67 (50.4)	19 (14.3)	8 (6.0)	1.97	.83
Create table(s) in a database.	35 (26.3)	57 (42.9)	31 (23.3)	10 (7.5)	2.12	.89
Define the primary key of a table.	36 (27.1)	63 (47.4)	23 (17.3)	11 (8.3)	2.07	.88
Define relationships between the tables.	37 (27.8)	62 (46.6)	28 (21.1)	6 (4.5)	2.02	.82
Create query(s) in a database.	40 (30.1)	66 (49.6)	21 (15.8)	6 (4.5)	1.95	.80
Create form(s) in a database.	39 (29.3)	62 (46.6)	23 (17.3)	9 (6.8)	2.02	.86
Create report(s) in a database.	39 (29.3)	60 (45.1)	25 (18.8)	9 (6.8)	2.03	.87

Overall Mean for Database: 2.03; Standard Deviation: 0.82

Telecommunication

This domain measures the teachers' competence for telecommunication as illustrated in Table 9. The percentage of teachers who stated that they are able to teach others to navigate the Internet and search for resources on the Internet is equivalent (60.9%). These two items also scored the highest percentage compared to the other items. Interestingly, more than 50% of the teachers reported that they are able to teach others how to use electronic mail (e-mail) service such as composing, sending, replying, and forwarding e-mails (59.4%), followed by to attach file(s) in the electronic mail (55.6%), print an electronic mail (52.6%), use social networking sites (51.9%) and to use messaging program such as online chat (51.1%).

According to the findings obtained, the level of telecommunication using the laptop among the teachers was found to be high with the mean value of 3.45 (S.D. = 0.61). Three items scored above the overall mean for telecommunication. The item "Search for resources on the Internet" had the highest mean score (M = 3.57, S.D. = 0.57) whereas two items, namely "Use messaging program such as online chat" and "Use social networking sites" had the lowest mean score (M= 3.36; S.D. = 0.76).

Table 9. Descriptive Statistics for Items on Telecommunication

Item	Not able to perform the task F (%)	Able to perform the task with some assistance F (%)	Able to perform the task without assistance F (%)	Able to teach others how to perform the task F (%)	Mean	Std. Deviation
Navigate the Internet.	0 (0)	7 (5.3)	45 (33.8)	81 (60.9)	3.56	0.60
Use electronic mail (e-mail) service (e.g: compose mail, send mail, reply mail, forward mail etc.).	0 (0)	11 (8.3)	43 (32.3)	79 (59.4)	3.51	0.65
Print an electronic mail (e-mail).	2 (1.5)	13 (9.8)	48 (36.1)	70 (52.6)	3.40	0.73
Attach file(s) in the electronic mail (e-mail).	1 (0.8)	19 (14.3)	39 (29.3)	74 (55.6)	3.40	0.76
Search for resources on the Internet.	0 (0)	5 (3.8)	47 (35.3)	81 (60.9)	3.57	0.57
Use messaging program such as online chat.	3 (2.3)	14 (10.5)	48 (36.1)	68 (51.1)	3.36	0.76
Use social networking sites (e.g: Facebook, Twitter, Instagram etc.).	2 (1.5)	17 (12.8)	45 (33.8)	69 (51.9)	3.36	0.76

Overall Mean for Telecommunication: 3.45; Standard Deviation: 0.61

Media communication

The results of the teachers' laptop competence from the media communication aspect are shown in Table 10. About one-third of the teachers (37.6%) are able to produce print-based products such as posters, brochures, and newsletters without assistance. Besides that, almost half of them (42.1%) are able to teach others how to transfer picture(s) from a digital camera into a laptop. As for the item "Use scanner", most of the teachers (39.1%) can teach others to perform the task. However, about one-third of them equally need some assistance recording sound using the microphone and painting tools (39.1%). Most of the teachers also need some assistance to do basic editing, such as changing the size, colour and cropping the graphic (36.8%).

The competence level of media communication among the teachers was moderate with the mean value of 2.86 (S.D. = 0.76). There were only two items out of six that scored above the overall mean for this domain — "Transfer picture(s) from digital camera into the laptop", and "Use scanner". The statement "Transfer picture(s) from digital camera into the laptop" scored the highest mean (M = 3.14, S. D. = 0.89) and the item with the lowest mean was "Record sound using microphone" with the value of 2.68 (S.D. = 0.93).

Table 10. Descriptive Statistics for Items on Media Communication using the Laptop

Item	Not able to perform the task F (%)	Able to perform the task with some assistance F (%)	Able to perform the task without assistance F (%)	Able to teach others how to perform the task F (%)	M	S.D.
Produce print-based products (e.g.: posters, brochures, newsletters etc.).	8 (6.0)	42 (31.6)	50 (37.6)	33 (24.8)	2.81	.88
Transfer picture(s) from digital camera into the laptop.	6 (4.5)	26 (19.5)	45 (33.8)	56 (42.1)	3.14	.89
Record sound using microphone.	11 (8.3)	52 (39.1)	39 (29.3)	31 (23.3)	2.68	.93
Use scanner.	3 (2.3)	34 (25.6)	44 (33.1)	52 (39.1)	3.09	.86
Use painting tools (e.g.: Paint, Adobe Photoshop etc.).	10 (7.5)	52 (39.1)	34 (25.6)	37 (27.8)	2.74	.95
Use basic editing on graphic(s) (e.g.: size, colour, crop etc.).	11 (8.3)	49 (36.8)	39 (29.3)	34 (25.6)	2.72	.94

Overall Mean for Media Communication: 2.86; Standard Deviation: 0.76

Multimedia integration

This subsection outlines the laptop competence among the teachers for multimedia integration as shown in Table 11. Most of the teachers reported that they are able to teach others to use multimedia presentation slides (48.1%), create multimedia presentations (47.4%), insert graphic(s) (42.1%), sound(s) (40.6%), and video(s) (38.3%) into the multimedia presentation slides. Nearly one third of the teachers equally reported that they can create interactive questions and answers such as quiz and exercises without assistance from others and teach others how to perform the task (33.8%). Generally, the teachers are also able to navigate while using the multimedia presentation slides without assistance (37.6%).

The laptop competence level in terms of multimedia integration was high with the mean value of 3.09 (S.D. = 0.82). There were three items out of seven items that scored above the overall mean for the integration of multimedia using the laptop — "Use multimedia presentation slides", "Create multimedia presentation slides", and "Insert graphic(s) into the multimedia presentation slide". Based on the findings, the item with the highest mean score (M = 3.32, S.D. = 0.78) was "Use multimedia presentation slides". Meanwhile, two items, namely "Insert video(s) into the multimedia presentation slide" (M = 2.95, S.D. = 1.00) and "Create interactive questions and answers" (M = 2.95, S.D. = 0.92) scored the lowest mean score.

Table 11. Descriptive Statistics for Items on Multimedia Integration using the Laptop

Item	Not able to perform the task F (%)	Able to perform the task with some F (%)	Able to perform the task without assistance F (%)	Able to teach others how to perform the task F (%)	M	S.D.
Use multimedia presentation slides.	4 (3.0)	14 (10.5)	51 (38.3)	64 (48.1)	3.32	0.78
Create multimedia presentation slides.	6 (4.5)	15 (11.3)	49 (36.8)	63 (47.4)	3.27	0.84
Insert graphic(s) into the multimedia presentation slide.	11 (8.3)	18 (13.5)	48 (36.1)	56 (42.1)	3.12	0.94
Insert sound(s) into the multimedia presentation slide.	11 (8.3)	24 (18.0)	44 (33.1)	54 (40.6)	3.06	0.96
Insert video(s) into the multimedia presentation slide.	12 (9.0)	34 (25.6)	36 (27.1)	51 (38.3)	2.95	1.00
Create interactive questions and answers (e.g.: quiz, exercise etc.).	8 (6.0)	35 (26.3)	45 (33.8)	45 (33.8)	2.95	0.92
Navigate while using the multimedia presentation slides (e.g.: forward, reverse, exit the show etc.).	10 (7.5)	28 (21.1)	50 (37.6)	45 (33.8)	2.98	0.93

Overall Mean for Multimedia Integration: 3.09; Standard Deviation: 0.82

Overall level of laptop competence

The eight domains to measure competence — basic laptop operation skills; setup, maintenance, and troubleshooting; word processor; spreadsheet; database; telecommunication; media communication; and multimedia integration were combined and calculated as one component to obtain the overall level of laptop competence among the secondary school Mathematics and Science teachers. The mean score attained from the summation of item scores of all the subscales was 3.11 (S.D. = 0.55), which showed that the overall laptop competence level among the Mathematics and Science teachers is high.

Relationship between Teachers' Laptop Competence and Laptop Use

Before conducting the inferential statistics, assumptions testing for normality, linearity, and homoscedasticity were performed on the collected data. Normality testing was done individually for each construct, and it found that the constructs were normally distributed. Thus, the preliminary analyses conducted found that there were no violations of assumptions.

Scatterplot was used to check on the assumptions and distribution of the two variables involved. As shown in Figure 1, it indicated a positive relationship between both the variables, which means that the scores on teachers' laptop competence are related to the scores on the laptop use of the secondary school teachers.
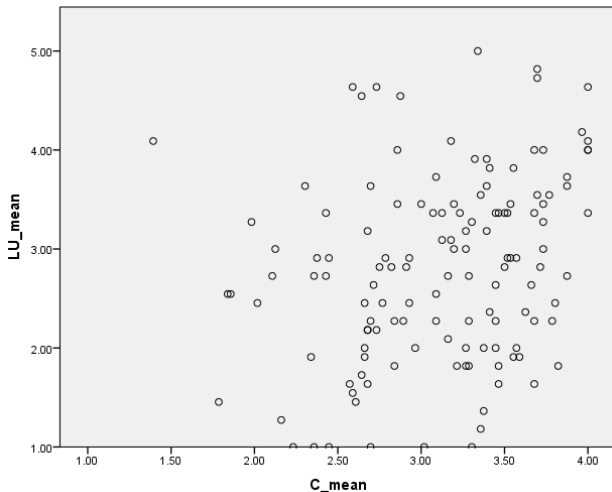
Figure 1. Distribution of Teachers' Laptop Use and Laptop Competence

The relationship between teachers' laptop competence and laptop use was performed using the Pearson product-moment correlation coefficient. As shown in Table 12, there was a significant positive correlation between teachers' laptop competence and laptop use (r = .27, n = 133, p < .01). A correlation coefficient of 0.27 indicates a small linear relationship between both variables (Cohen, 1988). It indicates that as the scores for competence increase, the scores for laptop use among the teachers also increase.

Table 12: Pearson Product-Moment Correlation between Teachers' Laptop Competence and Laptop Use

	Teachers' Laptop Use
	TLP
Teachers' Laptop Competence	.27*

* Correlation is significant at the .01 level (2-tailed)

4. Discussion

This paper focussed on the laptop competence among the teachers. Laptop competence was measured in terms of eight domains — basic laptop operation skills; setup, maintenance, and troubleshooting of laptop; word processing; spreadsheet; database management; telecommunication; media communication; and multimedia integration using the laptop. According to the results obtained, the teachers are reported to be between moderately and highly competent across the aforementioned domains.

Out of the eight domains, six of the domains were classified as high and two were classified as moderate. It was found that the teachers are highly competent in word processor (M = 3.62); followed by handling basic laptop operation (M = 3.60); telecommunication (M = 3.45); spreadsheet (M = 3.15); multimedia integration (M = 3.09); and setup, maintenance, and troubleshooting of laptop (M = 3.01). However, the teachers are only moderately competent in using the laptop for media communication (M = 2.86); and database (M = 2.03).

Most of the teachers are highly competent in handling word processors and basic laptop operation as these are important and commonly utilised for instructional purposes. The teachers can change text format in word processor and do not face problems in handling basic operation such as starting up or shutting down the laptop and using USB drives. These teachers are proficient in utilising both because they are required to use it for lesson planning and preparation and other academic purposes. According to Baturay et al. (2017) and Lau and Sim (2008), teachers are perhaps competent because of their frequent usage of word processing in lesson instruction and preparation. This is also supported by Masood and Ngah (2007), Zakaria et al. (2007), and Liu, Lin, Zhang, and Zheng (2018). However, the results of basic laptop operation skills contradicted the study conducted by Sa'ari et al. (2005), who reported that many of the respondents had a moderate level of competency in handling basic operation. In this research, teachers are well-versed in handling basic laptop operation apart from installing software programs by themselves into the laptop. This may be due to the lack of necessity to install the software as most of the needed applications are pre-installed by the vendor at the time of purchase.

For the telecommunication domain, the teachers were well-versed in telecommunication skills using the Internet. Rehn (2017) suggested that several factors such as insufficient time, isolated location, unreliable technology, and low teachers' confidence and experience could be why teachers do not use video conferencing. However, teachers are sometimes left without choice during certain phenomena such as the pandemic that drives teachers to use video conferring or any other means of electronic communication that transmit information over distance to interact with their students for instructional purposes. As for the spreadsheet application, teachers have no problem creating a spreadsheet with table(s) using rows and columns, but they face difficulty when they have to insert formula(s) to perform calculations using the function. According to Lau and Sim (2008), teachers commonly use spreadsheets to record their students' grades. Besides, the results from a study conducted by Agyei and Voogt (2014) showed that the teachers were sufficiently competent to develop and showcase their knowledge and skill in using the spreadsheet as an instructional tool. Hence, teachers are competent in using spreadsheets for instructional purposes, such as creating graphs, calculating grades,

recording attendance, and completing homework assignments.

Besides that, the level of laptop competence in terms of the multimedia application was found to be high. This finding was congruent with studies conducted by Lau and Sim (2008) and Zakaria et al. (2007). Thus, the teachers are familiar and experienced in using the multimedia presentation slides and do not face problems while integrating it in their lessons. These teachers stated that they are proficient in using the multimedia presentation slides compared to creating interactive questions and answers, and inserting video(s) into the presentation slides. This may easibly be due to the availability of the online interactive exercises and YouTube videos that teachers can easily access. As for the laptop setup, maintenance, and troubleshooting were found to be at the borderline of high competence level. The teachers do face difficulties in troubleshooting hardware problems. This is supported by Zakaria et al. (2007) who reported that teachers are less competent in handling or troubleshooting hardware problems. However, the teachers are able to scan the laptop for protection against viruses.

On the other hand, most of the teachers are only moderately competent in the aspects of media communication, and database. It could be possibly because these features are considered less crucial for their practical usage. The highest mean score for media communication domain was transfering picture(s) from digital camera into the laptop followed by using a scanner. This is because the teachers use mobile devices such as digital cameras to capture picture(s) and scanner to prepare teaching and learning materials. This finding is dissimilar with the results obtained by Sa'ari et al. (2005) and Tiede, Grafe and Hobbs (2015), who found that most of the teachers had low level of technology competence in utilising media communication. Additionally, teachers are very much less moderately competent in using the database application. Database scored the lowest mean as the teachers rarely use it for the teaching and learning interaction. Similarly, Slaouti and Barton (2007) also agreed that most teachers had not used database application. This finding is also supported by the research finding of Sarfo, Amankwah, Oti-Agyen, and Yidana (2016), which found that teachers were less competent in using database application required for pedagogical purposes.

After encompassing the eight domains cumulatively, the results obtained for the overall laptop competence among the secondary school Mathematics and Science was found to be high. The result obtained from this study was mostly in line with the research reported by Zakaria et al. (2007) which reported that respondents were highly competent in integrating technology for educational purposes. This could conceivably be due to the pandemic, as teachers learn and upgrade their knowledge and skills with the current needs of the education system through the availability of online resources. However, the laptop competence level differs according to its domain. Hence,

it is essential for the teachers to be competent in every domain as Ziden et al. (2017) highlighted that Malaysian teachers' ICT competency may hinder them from successfully utilising ICT.

The final analysis using the inferential statistics, Pearson correlation between the teachers' laptop competence and laptop use yielded expected results as supported by the previous studies. The findings are consistent with those of the former studies (Baturay et al., 2017; Raman & Shariff, 2017) that support the notion that there is a relationship between these two variables. This study found a significant positive relationship between the teachers' laptop competence and laptop use in Malaysia. This implies that the teachers' laptop competence can be a criterion for the simultaneous use of laptop among the teachers. It depicts that the teachers use the laptop when they have the skill and knowledge to utilise the laptop proficiently for their instructional purposes. Consequently, it has been proven with empirical data in this study that the teachers' laptop use is positively related to their laptop competence.

According to Suárez-Rodríguez, Almerich, Orellana, Díaz-García (2018), education systems in many countries have become inseparable from ICT in the last two decades. Indeed, the use of ICT tools is closely related to teachers' digital competency and adaptation to online teaching (König, Jäger-Biela, & Glutsch et al., 2020). While digitalisation in schools has become prominent in recent years, teachers' technology competency is critical because it is associated with learning design and quality of students' learning (König et al., 2020). Suárez-Rodríguez et al. (2018) described teachers as "decisive actors" who have the control to decide whether they want to use ICT in teaching. Moreover, it is mentioned that teachers' competencies are essential when they make the decision because teachers need to be competent and be able to master the technological resources to integrate ICT into teaching. Therefore, teachers with greater technological and pedagogical competencies do not only use ICT more frequently for personal and professional purposes, but they also optimise the use of digital educational resources with students to a greater extent (Suárez-Rodríguez et al., 2018).

5. Limitations

The researchers conducted this study to get a glimpse of teachers' competence in using laptops. Therefore, the results of this paper should not be generalised to the whole population of teachers in Malaysia mainly because only 133 Mathematics and Science secondary school teachers from the Federal Territory of Kuala Lumpur were selected as the respondents. Besides that, data from this study are from the secondary school teachers and may not be generalised for teachers at other levels such as pre-school, primary school, and higher education. Future research studies may be conducted on a larger scale using different approaches such as observations and interviews

6. Conclusion

Technology changes rapidly and teachers, headmasters, curriculum planners, policy makers and other relevant authorities are expected to adapt and allow these changes to occur by enthusiastically implementing the innovation as a challenge to move forward for a better education system for the generation of tomorrow in Malaysia. The main concern of this research was to determine the laptop competence in terms of eight domains among the teachers. The teachers' competence levels for each domain to incorporate the laptop for instructional purposes were identified via this study. Based on the results, the teachers are highly competent in word processor; basic laptop operation skills; telecommunication; spreadsheet; multimedia integration; and setup, maintenance, and troubleshooting of laptop but only moderately competent in using the laptop for media communication; and database. Thus, this paper can act as a guide to plan effectual training according to the needs of the teachers based on each item of the domains. This study was done comprehensively to identify every element of competence among the teachers in Malaysia. Further effective training sessions either face-to-face or virtually need to be conducted among the teachers who are only moderately competent to effectively use the laptop in teaching and learning. Such training sessions are also paramount to ensure that teachers do not fall out of touch with technology (Efe, 2011) during the pandemic.

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