

Digitalized Management Approach and Perceived Digital Fluency and Administrative Competencies among Primary Teachers

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Abstract

Digitalisation has improved the quality administrative services within learning institutions. This study aimed to determine the changes of teachers' perceived digital fluency and administrative competencies after the introduction of a digitalised management approach in their school. This study employed a quantitative approach and involved 51 regular teachers and 4 school administrator teachers in a primary school in Kinta district of Perak, Malaysia. Data was collected using online questionnaires before and after the introduction of a digitalised management approach in the form of google applications in the research setting and later analysed using descriptive and inferential statistics. The findings showed that there is a significant increment of teachers' perceived digital fluency and administrative competencies before and after the introduction of the digitalised management approach in their school. This study suggested that there is a need of collaborative efforts between the district education office, the state department of education and schools for training and supporting teachers and administrators to adopt a digitalised management approach using online and freely available platforms. Such adoption would reduce teachers and administrators 'workload and comply to the digitalisation of public sector initiative as reinforced through-the digitalisation of public sector strategic plan 2021-2025.

Keywords: Digitalized Management Approach, Digital Fluency, Administrative Competencies, Teachers, Primary Schools.

Introduction

The rapid development of digitalization in the era of the Industrial Revolution 4.0 (IR4.0) has affected almost all aspects of life. The emergence of various devices such as smartphones and high-tech laptops can help people perform most tasks virtually independent of time and place, "anywhere anytime" (Zaki & Sabli, 2020), as long as they have access to the internet. Now all the requirements of work assignments are no longer confined to the realm of the office.

Mobile technology has played an important role in adopting and developing the digital society, which is still evolving. The information society formed indirectly through the presence of various gadgets and high-tech devices, also known as e-society, operates in personal, social, and economic activities characterized by the ability to easily send data, internet access, interactive services, and applications that can be easily downloaded (Zaki & Sabli et.al., 2021). However, the issue of digitalization in the world of education has only revolved around the teaching and learning process and is rarely discussed in the field of school administration. The focus of previous research has been on the management of public administration as well as the private sector, such as banking and healthcare (Aziz et.al., 2018). Therefore, the approach of digitalization of management in school governance structures is worth studying.

School administrators should take bold steps to apply and cultivate technology by innovating through digitalization, taking into consideration the factors of saving time, money, and energy (Yusof et.al., 2018; Kamarudin et.al., 2020). This is in line with the Industrial Revolution 4.0 (IR4.0) and the Malaysian Ministry of Education (MoE), which launched the Digital Education Learning Initiative Malaysia (DELIMa) on 15 June 2020. DELIMa is a rebranding of the digital learning platform developed by MoE after Frog VLE. It is a multi-year joint effort by MoE with Google, Microsoft, and Apple to revamp the digital learning platform for teachers, educators, and students.

This ID Google of MoE- Digital learning has been distributed free of charge to all teachers and students in every school in Malaysia. Through this DELIMa programme, the digital literacy of students and parents can be strengthened in collaboration with educational institutions, whether it is a secondary or primary school. Therefore, the school management should use this opportunity to cultivate and reinforce digital management at the school level and indirectly drive one of the MyDIGITAL initiatives which focus on the digital transformation agenda of the public sector.

In an effort to improve the quality of excellent services, some school administrators have already taken the initiative to digitize school administration, which involves various tasks and documents from the three main units of Curriculum Management, Student Affairs, and Co-Curriculum. Using the Google applications provided in the DELIMa programme, all documents are digitized in Google Sheets, Google Slides, and Google Docs, stored in Google Clouds, and can be accessed through Google Sites, which serve to maintain, publish, organize, and even facilitate data access. This innovation reacts as '1 STOP CENTRE' as a place where teachers can centrally access all their routine work using their personal laptop or smartphone.

However, there is rejection from different quarters, be it from a person with official status from the highest organization such as the State Ministry of Education (JPN) and the District Education Office (PPD) or from teachers and administrators in schools because they have less knowledge, experience, and expertise in technology leadership (Wigati et. al., 2023; Akmar, 2022). Reasons cited include teachers' and administrators' unwillingness to change their conventional practices, a lack of necessary skills to embrace the digitized approach to administration, and that they prefer the old way of record keeping with lots of papers and documentation, which has become a habit for them even though it is proven burdensome (Muniandy & Kutty, 2019; Aiman, 2021), and such practices have led to problems with the inaccessibility of data and unsystematic organization and retrieval of data (Nazri, 2021; Aziz et.al. 2021). There is also a risk of these documents or files being damaged or lost (Kamarudin et.al 2020; Aziz et.al., 2021).

The conventional practices and requirements added to the existing teachers' workload, involving academic and non-academic tasks (Antin & Kiflee, 2018) such as clerical affairs,

being a guide and motivator, planning, co-curricular advisor, club leader as well as association, uniformed unit, elite sports coaches, the implementation of 21st-century teaching and many more resulting as one of the country's main issues (Kamarudin & Taat, 2020; Hisham, 2021; Hamami & Yassin, 2022). However, according to previous studies conducted by Marzuki et.al, (2020); Kamarudin et.al (2020); Adam et.al (2022) prove that cultivating technology and adopting digital practices in school administration can increase the efficiency of task performance.

Therefore, this study aims to see changes and improvements in the efficiency of administration after the introduction of digital administration based on the Google application provided by the Ministry through the DELIMa programme. Every government school in Malaysia has been provided with a user account that can be used and fully integrated with school administration. The school administration should take this opportunity to integrate technology into their daily routine. This initiative will bring about a paradigm shift in school administration from conventional to automated (Aziz, 2018).

The TAM model (Technology Acceptance Model) by Davis et al (1989), which is the technology acceptance model is used as a guide to carry out this study and integrates two of the five characteristics proposed by Spencer and Spencer's (1993) competency theory, namely knowledge, and skills to analyze and understand the objectives and research questions.

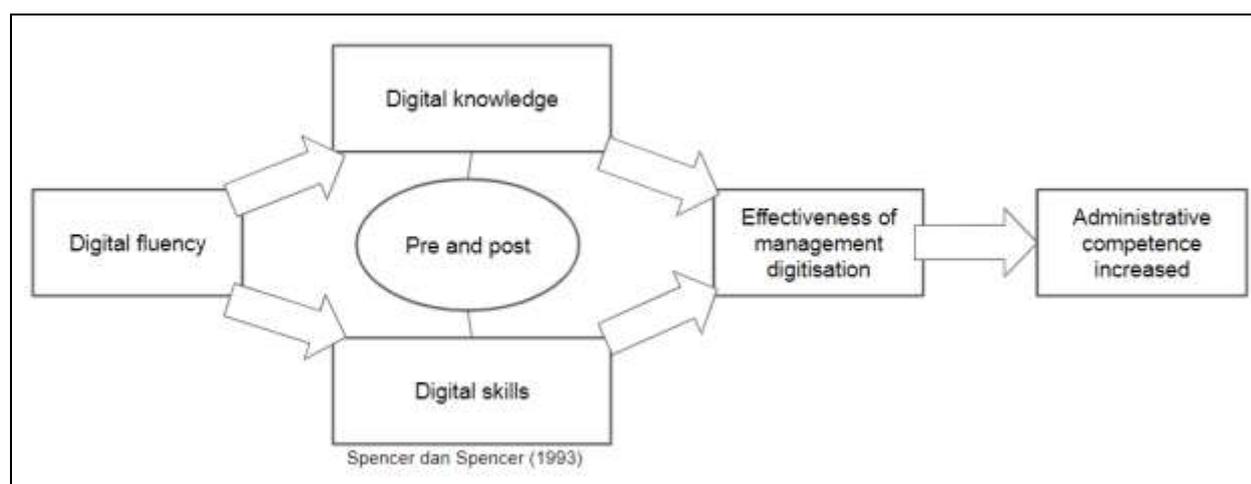


Figure 1 Study Concept Framework

Source: Model TAM (Davis 1989)

The model proposed by Davis in 1989 TAM, the Technology Acceptance Model, is used to describe and explain user acceptance of computer technology. The conceptual framework has been modified from this model to predict user acceptance of technology based on two of the five characteristics of digital literacy highlighted by Spencer & Spencer 1993, namely knowledge and skills. According to Hussin (2018), skills are something that can be easily identified and reflect the individual's ability to perform tasks well and excel in using the skills and knowledge they possess to achieve the goals of the task. The knowledge element is explained by the individual's ability to continuously improve their skills and self-performance in digital knowledge and can indirectly improve the administrative competence of the organization.

Purpose of The Study

This study aimed to determine the changes in teachers' perceived digital fluency and administrative competencies before and after the introduction of a digitalized management approach in their school which was in the form of Google applications. It is expected that the research findings can help school administrators and teachers manage information related to school administration and the teaching and learning process in an effective, timely, and systematic manner. It is expected that this will minimize problems related to teacher workload.

Literature Review

Development of Management Digitalisation

According to the Library Collection digitalisation Policy, the National Library of Malaysia on 11 June 2010, digitalisation is the process of converting printed/analogue formats (text, audio, video, graphics, etc.) into digital form. The purpose of this digitalisation is so that the data can be stored, easily retrieved and electronically disseminated. Digitalisation is a new effort that can improve data access through the medium of information and communication technology. The integration of digital technology can be referred to as digitalisation or digital transformation (Vallo Hult & Bystrom 2021).

In this respect, the digital revolution presented by Martin (2017) has come about as a result of the rapid development of information and communication technology in the Industrial Revolution 3.0 (IR3.0) era. It is also the beginning of the development of the internet, which also acts as a major factor in the transition from analogue technology to a digitalization system (Ibrahim, 2021). At the end of this era, the use and dissemination of digital computers and digital records happened very quickly and ushered in the era of Industrial Revolution 4.0 (IR4.0), which is based on the automation of digitalisation (Ismail, 2018).

IR4.0 involves the discovery of various new technologies in different fields, including the development of robotic technology, artificial intelligence, bio-, and nanotechnology, Big Data, and cloud computing (Malek, 2022; Abdullah, 2019; Sabry, 2021), which drives most machines, devices and buildings in the integration of physical, digital and robotic management and brings forth the digitalization process in businesses and public institutions. The widespread use of mobile devices such as smartphones and laptops (Ali et.al., 2020), as well as the development of the internet, are factors that make the transition to digitalization continue to this day. In addition, the implementation of digitalization has become more aggressive due to the Covid 19 pandemic that started in Wuhan in China in late 2019 (Izhar et.al (2021); Saro et. al (2022); Yusof & Jamaludin (2022), as a curfew has been imposed in most countries (Ibrahim & Razak, 2021; Siron, 2022).

Numerous inventions have led to a plethora of successes that have enabled industrial, commercial and managerial structures to reduce the cost of using human labour, increase productivity, improve operational efficiency, as well as streamline various jobs, improve accuracy and speed, reduce human error, increase competitiveness and even achieve effective cost savings (Ali et.al., 2019; Ismail, 2019; Manan, 2021; Nawi et al., 2021). This rapid and ever-evolving digital transformation has accelerated changes towards IR4.0.

The digitalization of management is used by most commercial, governmental and private organisations (Salleh et.al, 2018) as a technology that is very helpful and has been proven to increase the performance and excellence of organisations beyond the ordinary, simplify the process of a system and increase the quality and quantity of production and even speed up the workflow (Marzuki et. al., 2020; Shamsudin et.al., 2020).

In this regard, the Malaysian government is not behind in its journey to becoming a digital government that focuses on efficient and effective public services. The history of e-government development or revolution in Malaysia started with E-Gov 1.0: 1995, E-Gov 2.0: 2007 and then Digital Government E-Gov 3.0: 2011 (Aziz, 2018). The Malaysian government's strong commitment to promoting digital innovation to support the digitalisation of the public sector continues through the Public Sector ICT Strategic Plan 2016 - 2020 and is further expanded with the launch of the Public Sector Digitalisation Strategic Plan (PSPSA) 2021 - 2025, with a view to sustainable digital government and building a digital society to achieve digital nation status by 2050.

The Public Sector Digitalisation Strategic Plan (PSPSA) 2021-2025 is a Malaysian government initiative to transform the public sector through digitalisation. There are four key strategic thrusts as the plan outlines; consolidating integrated and inclusive digital services, strengthening digital infrastructure, empowering the culturalisation and professionalism of ICT and having a comprehensive and sustainable ICT governance.

By adopting a digitalized management approach, schools can align with the objectives of the Public Sector Digitalisation Strategic Plan 2021-2025, contribute to the overall digital transformation of the public sector, and create a more efficient, effective, and student-centred learning environment. Based on the vision of the "Empowered Digital Government that Develops Digital Society", this innovation initiative on the school administration management supports the government's initiative from the perspective of the fundamental digitalisation of data-driven digital services, the results of data analytics and artificial intelligence in improving the effectiveness of service delivery, and subsequently becomes a driving force on the path to an empowered digital government and the formation of a digital society.

Digitalisation of education management in Malaysia

The Malaysian government is one of the countries that have a proven track record of actively using the digitalization approach in various administrative areas under IR4.0. Digitalization of management in the field of administration helps to facilitate the implementation of various governance arrangements as communication between an organization and users in the system through digital means can improve the information delivery system and be even more efficient and orderly.

The Malaysian Ministry of Education (MoE) has also developed various online applications including the Educational Management Information System (EMIS) Online, the Student Information System, the Integrated Assessment Instrument for Education Service Officers (Timbang & Ambotang, 2020), the Student Database Application (Nuin et. al., 2020), the Physical Activity Sports & Curriculum Assessment System, the School-based Assessment Management System, the Student Discipline Misconduct System, the School Examination Analysis System, and many more to help educators manage data in school management and administration. Apparently, this digital technology is also seen as a tool for more efficient, systematic, and effective management of data and information in meeting various academic needs (Benavides et.al., 2020; Nuin et.al., 2020).

Although various applications have been developed to help teachers manage data quickly and efficiently, some of them still use conventional methods. This is still the case because administrators have to contact the teacher who manages the system to get information from the application. This is because all applications are different platforms and have their own

coordinators who manage the data. A more critical problem arises when the coordinator of the platform cannot be contacted when information is urgently needed (Aziz et.al., 2021). Using conventional methods can also cause problems such as information and data being inaccurate and inconsistent, data taking a long time to process, resulting in time constraints for analysis, and the fact that the information cannot be disseminated in the desired time. The smooth running of an organization is disrupted by these factors. In addition, digitalization is slow pace among educators, whether they are in schools, State Ministry of Education (JPN) or the District Education Office (PPD), because most of them are still comfortable with conventional methods and are more interested in looking at piles of files and documents. This approach is not in line with the government's desire to make digital a driving force to improve the efficiency of school administration (Yusof, 2018).

Digitalized Management Approach Using Google Applications

The rapid development of technology has led to an increase in the amount of excessive and redundant information, making it increasingly challenging for administrators to manage (Sprague, 1995; Roetzel et.al., 2019). The process of managing information more efficiently and effectively is a major challenge for many organizations, especially school administrators. School management is constantly struggling with the slowness of official documents involving three large administrative units, so an initiative is needed to effectively and systematically manage and control the organization. The ability of management to change the use of physical records to digital records can help reduce the use of paper so that digital records can eventually be stored electronically and are easy to organize. As a result, management in terms of data analysis and presentation between agencies or departments is more easily done electronically.

The initiative to digitize documents using Google applications, is an innovation involving three major school administration departments, is a better way to make document management more memorable, systematic, organized, and even easier to use (Nur Aiman, 2021). School database management with Google Sites is used as a website and acts as the main launcher, integrated with various other Google applications such as Google Sheets, Google Slides, Google Docs, Google Forms, and Google Classroom, which are stored in the cloud, i.e. Google Drives. Through this convenience, this innovation will react as '1 STOP CENTRE' so that teachers can centrally access all matters involving curriculum, student affairs, extracurricular affairs, human resources, and student performance via their personal computer or smartphone. All tasks related to reporting and documentation can be done regardless of time and even school organizations can use this innovation for free (Nur Aiman, 2021).

Administrative competence from a digital skills perspective

Competency in education and scientific research is an ability that is mastered and possessed by individuals through direction, experience and the ability to perform tasks Glaesser (2019) while the study by Rahman et al (2019), found that it is a qualification, leadership, ability, and efficiency in carrying out a task. Furthermore, according to Long (2018) competence is the skills, knowledge, and behaviour that need to exist for an individual to carry out roles and responsibilities brilliantly.

Through the explanation of competence theories by Glaesser (2019); Rahman et al (2019); Long (2018), it can be illustrated that the level of competence of an individual is the ability to provide an overview of the organization's competence in performing routine daily tasks to achieve the organization's Key Performance Indicators. So, in parallel with the development

of IR4.0, the presence of digital technology, which includes experience, qualification, knowledge, skills, abilities, efficiency, and digital leadership, can increase the competence in the administrative management of an organization. Digital capabilities are important in the concept of competence, which reflects the level of an organization's ability to manage effectively. For example, the rapid development of RI 4.0 helps in the shift of competency theory supported by the statement of Spante et.al (2018) where the European Union has published a Digital Competence Framework to improve digital skills to promote economic growth and competitiveness. Sweden, on the other hand, is an example of a country that has used digital competence as a conceptual basis for the digitization of education in order to develop digital technology capabilities and to understand how the effects of digitalization affect individuals and society (Spante et al., 2018).

The administrative competence from a digital skill perspective refers to the ability of individuals or a team in administrative roles to effectively and efficiently use digital tools, technologies, and platforms to perform their administrative tasks. It involves a range of digital skills and knowledge that are essential for managing and organizing information, communicating, collaborating, and problem-solving in a digital work environment. Digital fluency refers to the ability to effectively and confidently use digital technologies to access, evaluate, create, and communicate information. It goes beyond basic digital literacy and encompasses a deeper understanding of digital tools, platforms, and their applications in various contexts. Digital fluency involves both technical skills and critical thinking abilities to navigate and utilize digital resources effectively.

The digital fluency can significantly improve administrative competency by enhancing efficiency, communication, decision-making, and data management in administrative tasks. Overall, digital fluency empowers administrators to leverage technology effectively, leading to improved administrative efficiency, communication, data management, decision-making, and resource utilization. By embracing digital fluency, administrators can enhance their competencies and contribute to creating more streamlined and effective administrative processes within educational institutions.

Methodology

The study is based on a survey research design and was conducted in a primary school in Kinta Utara, Perak. Using the purposive sampling method, four administrators and 51 teachers from the school were selected as research participants. Participants in this school use this digital management approach in their daily routine in school, then this entire population has certain characteristics of the participants and coincides with the selection of the method of purposeful sampling (Fraenkel & Wallen, 1993; Chua, 2014; Feng et.al, 2021). Data was collected using online questionnaires available in Google form as this is an effective and easy medium to disseminate and obtain data (Zaki & Sabli, 2020).

The questionnaire consisted of three sections, namely demographic information (section A), digital literacy (section B), and Administrative Competence (section C). Section A contained the participants' demographic data such as gender, seniority, academic qualification, and management positions in the school. On the other hand, section b contains 16 items to measure the participants' level of digital literacy, indicated by digital knowledge (eight items) and digital skills or the ability to use digital applications (eight items). Finally, there are 14 items in section c that measure the administrative competence of the school management before and after the introduction of the digitalization approach with the Google application. All items in sections b and c were items on a five-point Likert scale that recorded the

participants' level of agreement with the given statements on a scale from "strongly disagree" to "strongly agree"

The research question form consisted of demographic information, digital literacy as well as ICT knowledge and skills, which were adapted and modified multiple times in combination by Faisal (2021); Omar et al (2021), and then went through the validation process by experts. The original instrument items have been modified in terms of the purpose and suitability of the items according to the concept to be studied so that the instruments used have gone through the correct instrument validation procedures.

Data Analysis Methods

Data from the questionnaires were analysed using descriptive statistics in SPSS version 22.0 software. Subsequently, the mean values for digital fluency and administrative competence were included in the interpretation table in Table 1.

Table 1.

Interpretation of mean values

Level	Very Low	Low	Simple	High	Very High
Average score	1.00 – 1.80	1.81 – 2.60	2.61 – 3.20	3.21 – 4.20	4.21 – 5.00

Source: Mansor et.al (2021)

Validity and Reliability

A pilot study was conducted to ensure that the items in the questionnaire were valid and reliable. As stated by Isaac & Michael (1995), the appropriate sample size for a pilot study is between 10 to 30 samples while Treece & Treece (2005) suggested 10% of the actual sample size of the study. Based on this suggestion, to validate the items, ten teachers from the school were included in the pilot study to check the validity of the questionnaires. The teachers helped in the study to ensure that the instructions and items in the questionnaires were easy to understand.

Table 2

Cronbach's Alpha Value of Items

Item	Number of Items	Cronbach's Alpha Value
Section B - Digital fluency		
Dimension 1 – Digitalisation concept knowledge	8	0.981
Dimension 2 - Digital Skills	8	0.990
Section C - Administrative Competence	14	0.968
Total	30	0.98

Based on table 3, according to Chua (2020), Cronbach's alpha value must be above 0.7 to achieve validity. As shown in Table 2 above, Cronbach's alpha exceeds 0.7 for the three constructs. Section B, digital fluency is divided into two dimensions, namely Dimension 1, knowledge of the concept of digitalization while Dimension 2, digital skills, have a Cronbach's alpha of 0.981 and 0.990, respectively, while Section C, administrative competence, has a

value of 0.968, indicating that the items are considered reliable for measuring the constructs. The overall Cronbach's alpha is 0.98. All the data were found to be very good and effective, with a high degree of consistency. This also shows that the items are stable and can be used in real research studies.

Table 3

Cronbach's Alpha Score Interpretation

More like Alpha Cronbach	Interpretation of Reliability
0.9 – 1.0	Very good and effective with a high level of consistency
0.7 – 0.8	Good and acceptable
0.6 – 0.7	Acceptable
< 0.6	Item needs repair
< 0.5	Items need to be dropped

Source: Chua (2020)

Results*Demographics*

Table 4

Respondent profile

Things	Frequency	Percent
Employment		
• Ordinary Academic Teacher	36	65.5
• Head panel	7	12.7
• Special posts	3	5.5
• Co-curriculum teacher	5	9.1
• Administrator	4	7.3
Gender		
• Men	12	21.8
• Woman	43	78.2
Graduate of		
• Diploma	7	12.7
• Degree	42	76.4
• Masters	6	10.9
Service length		
• 1 – 10	8	14.5
• 11 – 20	26	47.3
• 21 - 30	21	38.2

The study involved 55 primary school teachers consisting of 51 teachers and 4 administrators. As shown in Table 4, the majority of respondents were female (78.2%) and had an academic degree (76.4%). 47.3% of the respondents served between 11 and 20 years, and the majority of the respondents were experienced teachers.

Teachers' Digital Fluency

Table 5

Pre and Post Test of digital fluency level

Digital fluency	Digitalisation concept knowledge								Digital skills								Mean
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	
Pre Test	2.6	2.8	3.0	3.1	3.3	3.4	3.4	3.4	3.4	3.5	3.3	3.3	3.4	3.3	3.4	3.2	3.26
	1	1	7	4	4	0	7	7	1	2	2	8	7	0	5	5	
	Mean: 3.16								Mean: 3.38								
Post Test	3.8	3.8	3.9	4.1	4.0	3.7	4.0	3.7	4.0	4.0	3.9	3.6	4.0	3.9	4.3	4.1	3.96
	5	9	4	1	3	4	7	2	1	5	8	0	7	4	3	1	
	Mean: 3.92								Mean: 4.01								

Table 5 shows the results of the pre- and post-tests of teachers and administrators in terms of digital fluency analysed based on the knowledge level of the digitalization concepts and the level of digital skills. The mean score of the pre-test was 3.26, and the min score of the post-test was 3.96. The Stage position for the min score for these two findings based on the interpretation scale is in a high position, which is between the min scale of 3.21 - 4.20. All results showed an improvement for each item on the Post Test versus Pre-Test and even a slight increase occurred in the mean score. This shows that there has been an increase in the level of digital fluency of the respondents after being introduced to the digitalization of management.

The overall mean score for pre-test, Digitalisation concept knowledge is 3.16. The Stage position for the mean score based on the interpretive scale is at a modest position that is between the mean scale of 2.61 - 3.20. Digital skills, the overall mean score is 3.38. The overall stage position for the mean score based on the interpretation scale is in the high position, which is between the mean scale of 3.21 - 4.20.

The overall mean post-test score for Digitalisation concept knowledge is 3.92. The Stage position for the mean score based on the interpretation scale is in the high range, i.e. between scale of 3.21 and 4.20. In the case of Digital skills, the overall mean score is 4.01. The overall level position for the mean score based on the interpretation scale is also in the high range, i.e. between the min scale of 3.21 - 4.20.

It was found that there was a significant difference in the mean score between the two pre-tests and post-tests for Dimension 1. The mean score of the pre-test was 3.16 compared to the post-test which was 3.92. The increase in the interpretation scale from the modest level to the high level proves that the level of knowledge about the concept of digitalization has improved significantly. This is probably due to the fact that the respondents have been directly exposed to the true meaning and digitalization concept through the approach of digitalization in school administration.

In contrast to the results of the digital skill level, most of the scores on the interpretation scale were in the range between 3.21 and 4.20 and thus at a high level. This shows that respondents have already mastered digital skills. This result supports the fact of Rosli et.al (2022); Omar

et.al (2021) that the implementation of learning activities to improve ICT skills and knowledge to a higher-level during curfew contributed to the improvement of digital skills of respondents.

Table 6.

t Test Level of digital fluency

N	Pra test	Post Test	df	t	p
	Mean	Mean			
55	49.44	59.64	10.2	10.488	0.000

Data were then measured using a paired t-test. This t-test helps to find a statistically significant difference between the two tests.

Study issue:

- i. Is there a significant difference between the pre-test and post-test of respondents' digital fluency levels before and after the management digitalization approach?
- ii.

The digital fluency improvement result showed a significant difference, and it was found that there was a positive increase in the average mean score, a difference of 10.2. The paired T-test data showed that the post-test mean score was 59.64, which was higher than the pre-test mean score of 49.55. The data suggests that the digital fluency of the respondents improved significantly after the introduction of the digitization of the administration.

The t-value for the findings of pre and post-data is $t = 10.488$ and a significant level of $p = 0.000$. This significant level is smaller than 0.05 ($p < 0.05$). This result indicates that there is a significant difference between pre and post-test of respondents' digital fluency levels before and after the management digitalization approach.

Teachers' Administrative Competencies

Table 7.

Administration competencies

No.	Item	Number of Frequencies and Percentages					Mean	Level of Interpretation
		SNA	NA	N	A	SA		
1	Management Digitalization helps in terms of school financial savings and reduces paper wastage.	0 (0%)	0 (0%)	2 (3.6%)	13 (23.6%)	40 (72.7%)	4.69	Very high
2	Management Digitalization helps save time in managing data	0 (0%)	0 (0%)	3 (5.5%)	13 (23.6%)	39 (70.9%)	4.65	Very high

3	Management Digitalization reduces the burden of preparing files in terms of saving time, energy and money	0 (0%)	0 (0%)	3 (5.5%)	13 (23.6%)	39 (70.9%)	4.65	Very high
4	Before introduced to management Digitalization, administrators/teachers faced difficulties in obtaining information and data quickly	0 (0%)	0 (0%)	5 (9.1%)	14 (25.5%)	36 (65.5%)	4.56	Very high
5	Before introduced to management Digitalization, administrators/teachers faced difficulties in obtaining accurate information and data	0 (0%)	0 (0%)	5 (9.1%)	13 (23.6%)	37 (67.3%)	4.58	Very high
6	Management Digitalization avoids the risk of losing information and data	0 (0%)	0 (0%)	4 (7.3%)	13 (25.5%)	37 (67.3%)	4.6	Very high
7	Management Digitalization helps the administration/teachers to manage data and information more systematically	0 (0%)	0 (0%)	5 (5.5%)	14 (25.5%)	38 (69.1%)	4.63	Very high
8	Management Digitalization enables the administration to perform tasks quickly	0 (0%)	0 (0%)	5 (9.1%)	9 (16.4%)	41 (74.5%)	4.65	Very high
9	Management Digitalization helps administrators and teachers to distribute/analyse information and data in a fast pace as well as a suitable format to those who need it quickly	0 (0%)	0 (0%)	5 (9.1%)	10 (18.2%)	40 (72.7%)	4.64	Very high

10	Management Digitalization helps administrators and teachers collect information and data and be able to make decisions in a short time	0 (0%)	0 (0%)	4 (7.3%)	11 (20%)	40 (72.7%)	4.65	Very high
11	Management Digitalization helps administrators build and form a good reputation for PPD and JPN officers. (from the aspect of data submission to parties in need)	0 (0%)	0 (0%)	5 (9.1%)	12 (21.8%)	38 (69.1%)	4.6	Very high
12	Management Digitalization increases the productivity and performance of administrative management	0 (0%)	0 (0%)	4 (7.3%)	11 (20%)	40 (72.7%)	4.65	Very high
13	Management Digitalization helps administrators and teachers manage the backlog of tasks involving curriculum, student and co-curricular affairs.	0 (0%)	0 (0%)	4 (7.3%)	12 (21.8%)	39 (70.9%)	4.64	Very high
14	I agree that this management Digitalization initiative can improve the efficiency and delivery of school administration services.	0 (0%)	0 (0%)	3 (5.5%)	11 (20%)	41 (74.5%)	4.64	Very high
	Mean						4.62	Very high

As shown in Table 7, the average mean of the mean score for school administrative competence is 4.62, which is in the very high range. This shows that the majority of respondents strongly agree that the approach of digitizing administration has led to an improvement in the management competencies. It can be noted through the mean score of each item found to be in the Very High position, between 4.21 - 5.00. This explains that the majority of respondents strongly agree that the approach to digitalizing administration has been successful and illustrates the effect of improving management skills in school administration. The highest score was 4.69 and 72.7% of them agreed with the item Digitization of administration helps in financial management of the school and reduces paper

waste. Digitization management helps administrators manage tasks related to curriculum, student affairs, and curricular matters. Each score was 4.65 and 4.64 respectively and both had 70.9% strong agreement.

Discussion

This study showed teachers' level of digital fluency and administrative competencies were increasing after being introduced to management digitalization. The level of digital fluency mastered by teachers had a positive impact and indirectly increased the effectiveness of management digitalization, which in turn improved the administration management competence. It is supported by Amir et.al (2018) findings that the tremendous benefits of digital approach help improve teachers' digital fluency and administrative skills.

The digital approach to administration forces teachers to master digital skills because it involves tasks that must be done every day. The results of this study show that their digital fluency has improved without them being aware of it. It is supported by Herdiawan (2021) that development of technology has forced teachers to master and utilize technology that is achieved gradually and sustainably, both self-taught and through training given. Demographic data indicate that this school has an advantage in the form of a relatively high number of experienced teachers, 76.4% of whom have higher qualifications, which shows that the organisation of the school meets current development needs. Teachers play an important role in the effort to transform the country's education system because teachers are the ones on the front lines. The role of teachers is becoming more complex and challenging and must reach the standard of global level so that their knowledge is referenced in Malaysia's Education Development Plan 2013-2025 (Makhsin et.al., 2022).

Involving experienced teachers who have skills and receive academic training can have a positive impact on work culture, which indirectly affects school administration. Experience is empirical knowledge and the ability to summarise is theoretical knowledge; both are mutually dependent to produce quality teachers and achieve maximum efficiency (Hasami & Buang, 2021). Experience and training are two different things, but they are interrelated when it comes to a teacher achieving the required level of performance.

To reach the quality of experienced and highly qualified teachers, a good personality, perseverance, ability and high motivation are required. This is supported by the results of a study conducted by Amir et. al 2015, which states that teachers' pedagogical, personal, social, professional, intellectual and spiritual skills influence their work performance. The need, ability, and willingness of teachers to increase their professionalism and adapt to technology not only affects the PdPc, but also the administration and task management in schools. Through the training offered, teachers have the opportunity to improve their skills and increase the level of professionalism and indirectly show their ability as individuals to contribute to the improvement of the competence of the educational organisation. This indirectly increases the effectiveness of the digitalization of administration.

The findings also found that teachers believe that a digital management approach saves time, energy, and money, as well as reduces data processing time and issues related to data loss. It is also support by Saari (2018) that the benefits of the digital approach to administrative management are high and also support the results of the study conducted by Sharipah et.al, (2021) which states that the approach of digitalization through the Invenmed System Innovation Project in the management of "*Ubat-Ubatan*" Inventory provides useful benefits to medical staff and even managed to reduce the burden of tasks performed daily.

Tasks that can be shared "online" and 'in real time' between administrators and other departments are an advantage in the digitalization culture of administration. This is supported by the Ghani et.al (2022) study, which found that innovations implemented online succeeded in accelerating a targeted supervision task. The study also suggested that the majority of teachers strongly agree that digital management approach is successful in improving their administration management competence. Digitising the administration using the free Google application provided by the Ministry in this study is very helpful in completing daily tasks because it is user-friendly and the data is easy to organise. This finding is supported by the study of Nur Aiman, (2021), which states that it is a system that is not burdensome, easy to use and can be implemented in a short time.

Conclusion

Based on the findings of the study, it was found that the digitized management of school administration brings benefits and even has maximum impact on respondents in terms of understanding the concept of digitization, improving digital skills, and even changing respondents' perception of information technology. In addition, teachers are often portrayed as reluctant users of technology, even though access to technology in schools is increasing. Digitized administration with Google applications is an innovation for school management. Three main units are combined into one system and reacts as '1 STOP CENTER', allowing teachers to access data centrally. This proves that teachers are embracing digital administration reform well. Therefore, the authorities involved in the development of data management systems should think about a simple and user-friendly platform that will help teachers perform their routine tasks, rather than creating a separate platform for each system.

Further research should be conducted to prove that digitalization of administration can also help educational organizations to improve students' academic progress and personality. Supported by Van Wart et.al (2019), as an added bonus, the quality of the two-way relationship between administrators and departments has been shown to improve, and that the quality of the relationship between the organisation's leadership and staff is enhanced by the virtual environment. If an educational organization can increase labor productivity efficiently and quickly without pressure, become more prosperous, and be able to create a better life for the community, then it is not impossible that there will be a change from IR4.0 to the next level, Society 5.0.

Community 5.0 or "smart society" or even "intelligent society" is a community that can solve various challenges and social problems by using the variety of innovations that emerge in the age of IR4.0 in the formation of values in people, so that it facilitates people's daily work, in addition to being efficient and skillful in the use of technology, which is in IR4. 0 (Darmaji et.al., 2019). In addition, given the current challenges such as the increasing spread of COVID 19 as well as the hot temperatures from April 2023, educators are required to always be attentive and take the opportunity to use digital management so that tasks can continue to be well implemented.

It is hoped that this study can fill the gap and pave the way for further studies. The digitalization of administration must be extended to all agencies in each ministry and state government, especially school administration. School administration must take advantage of every available space and opportunity to be competitive in the context of effective administration and service delivery at the global level, and indirectly support the Strategic Plan for the Digitization of the Public Sector 2021 - 2025.

References

- Ab Hamid, R., Mokhtar, U. A., Yusof, M. M., & Warland, A. (2019). Electronic records management in schools: The case study of school examination analysis system. *Jurnal Pengurusan*, 57, 142-154. <https://doi.org/10.17576/pengurusan-2019-57-10>
- Abdullah, F. (2019). Fenomena digital era revolusi industri 4.0. *Jurnal Dimensi DKV Seni Rupa dan Desain*, 4(1), 47-58.
- Adam, S. D. S., Mokhtar, S., Othman, I. W., & Hamid, J. A. (2022) Impak Transformasi Digital Terhadap Kecekapan Perkhidmatan Awam Di Sabah.
- Ahmad, A. N. W. B. (2018). Kemahiran Dan Teknologi Dalam Menghasilkan Sumber Manusia Yang Mampu Meningkatkan Mutu Kerja Dan Produktiviti (Skills and Technology in Producing Capable and Productive Work Force). *Trends in Undergraduate Research*, 1(1), h45-49. <https://doi.org/10.33736/tur.1184.2018>
- Ali, A. N. U. A. R., Salleh, M. A. M., & Mustaffa, N. O. R. M. A. H. (2020). Memobilia dan Kesedaran Wasiat Digital dalam Kalangan Belia Malaysia. *Jurnal Komunikasi: Malaysian Journal of Communication*, 36(2), 71-91. ISSN 0128-1496
- Ali, R., Dom, M. I. M., Hashim, A. Y. B., & Hamdin, M. R. (2019). Peningkatan Kecekapan Pengurusan Agensi melalui Pendekatan Pendigitalan Dokumen. *Sains Humanika*, 11(1).
- Antin, A., & Kiflee, D. N. B. A. (2018). Pengaruh beban tugas dan motivasi terhadap keefisienan kerja guru sekolah menengah di Sabah. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 3(2), 77-84. <https://doi.org/10.47405/mjssh.v3i2.81>
- Amir, A., & Hashim, Z. (2015). Pengaruh Kompetensi Guru Terhadap Prestasi Kerja Guru Sekolah Menengah Atas Negeri Di Kota Pariaman Sumatera Barat. *Management Research Journal*, 4, 103-118.
- Aziz, A. A., Yusof, Z. M., Mokhtar, U. A., & Jambari, D. I. (2018). Penerimgunaan Sistem Pengurusan Dokumen dan Rekod Elektronik: Protokol Pembangunan Instrumen dan Kesahan Kandungan Menggunakan Nilai Ketetapan Kandungan. *Jurnal Pengurusan*, 53, 119-132. <https://doi.org/10.17576/pengurusan-2018-53-11>
- Aziz, S. H., Nordin, N. L. B. M., & Mutalib, Z. A. (2021). eFILE Penyelaras Kursus. *Journal on Technical and Vocational Education*, 6(1), 129-139.
- Aziz, S., Raop, N. A., & Shukor, M. F. A. (2021). Pengaruh faktor teknologi maklumat dan komunikasi terhadap kualiti hidup dalam kalangan belia. *Jurnal'Ulwan*, 6(1), 110-126.
- Basri, M., Rahman, H. A., Yaakob, N. I., Othman, H. (2019). Penggunaan Teknologi Maklumat dan kesan Terhadap pengurusan pengetahuan di badan berkanun kerajaan negeri Selangor
- Benavides, L., Tamayo Arias, J., Arango Serna, M., Branch Bedoya, J., & Burgos, D. (2020). Digital Transformation in Higher Education Institutions: A Systematic Literature Review. *Sensors*, 20(11), 3291. MDPI AG. Retrieved from <http://dx.doi.org/10.3390/s20113291>
- Chua Yan Piaw. (2014). Asas Statistik Penyelidikan. Edisi Ketiga. Kuala Lumpur: McGraw-Hill Education Sdn.Bhd
- Darmaji, D., Mustiningsih, M., & Arifin, I. (2019, December). Quality management education in the industrial revolution era 4.0 and society 5.0. In *5th International Conference on Education and Technology (ICET 2019)* (pp. 565-570). Atlantis Press.
- Don, A. G. (2018). Pengurusan Masjid Era Digital Dalam Masyarakat Majmuk Di Malaysia.
- Faisal, S. A. M., & Adnan, N. H. (2021). Tahap Kesediaan dan Penerimaan Guru Dalam Mempraktikkan Penggunaan Teknologi Digital RI 4.0 Sebagai Bahan bantu Mengajar Dalam Pendidikan Rendah. *International Journal of Advanced Research in Islamic Studies and Education*, 1(3), 66-80.

- Feng, F. L. Y., Fen, K. G., Liang, K. P., & Shin, L. H. (2021). Kaedah Pengajaran Dalam Talian Guru Bahasa Melayu Dan Motivasi Murid Sekolah Jenis Kebangsaan Cina Sepanjang Tempoh Perintah Kawalan Pergerakan (A View into Online Teaching Methods of Malay Language Teachers and Students' Motivation in Primary School during Movement Control Order). *Jurnal Pendidikan Bahasa Melayu*, 11(1), 57-74.
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (1993). How to design and evaluate research in education (Vol. 7). New York: McGrawHill
- Garcia-Penalvo, F. J., Huang, F., Sánchez-Prieto, J. C., Teo, T., & Olmos-Miguelanez, S. (2019). Cultural values and technology adoption: A model comparison with university teachers from China and Spain. *Computers & Education*, 133, 69-81. <https://doi.org/10.1016/j.compedu.2019.01.012>
- Ghani, R. A., Zakaria, N. A., & Cheman, N. (2022). Sistem Penilaian Projek Inovasi (SPPIV) Bagi iCOMPEX' Di Politeknik Sultan Abdul Halim Muadzam Shah (POLIMAS): Satu Sorotan Kajian. *International Journal Of Education, Psychology And Counselling (IJEPC)* Volume 7 Issue 46 (June 2022) PP. 624-639
- Glaesser, J. (2019). Competence in educational theory and practice: a critical discussion. *Oxford review of education*, 45(1), 70-85.
- Hakim, J. A., & Singh, D. (2020). Teori Kompetensi: Ulasan Dari Perspektif Kemahiran Digital. *Malaysian Journal Of Information And Communication Technology*, 5(1)
- Hamami, H. B., & Yassin, M. A. M. Z. B. (2022). Beban tugas sampingan guru di sekolah rendah di Negeri Johor. *JuPiDi: Jurnal Kepimpinan Pendidikan*, 9(1), 1-20.
- Hasami, H., & Buang, N. A. (2021). Keperluan program pembelajaran sepanjang hayat (ppsh) kepada tenaga pengajar institusi latihan perindustrian (ILP). *International Journal of Education and Pedagogy*, 3(4), 131-141.
- Herdiawan, R. D. (2021). Platform Pembelajaran Daring Dalam Masa Pandemi Covid 19 Pada Perkuliahan Teaching Internship. In *Prosiding Seminar Nasional Pendidikan* (Vol. 3, pp. 29-32). Retrieved from <https://prosiding.unma.ac.id/index.php/semnasfkip/article/view/556>
- Husin, R. B. (2019). Hubungan Amalan E-Kerajaan Dengan Prestasi
- Hussin, N. D. M. (2018). Kompetensi Guru Terhadap Pengurusan Kokurikulum Di Sekolah Menengah Daerah Mersing. In *Prosiding Seminar Kebangsaan Majlis Dekan Pendidikan Universiti Awam 2018* (pp. 556-562).
- Ibrahim, I. S. (2021). Fantasi Atau Realiti: Transformasi Rtm Ke Arah Penyiaran Radio Digital: Fantasy Or Reality: Transformation Of Rtm Towards Digital Radio Broadcasting. *Jurnal Komunikasi Borneo (JKoB)*, 9, 1-15.
- Ibrahim, S. A., & Razak, K. A. (2021). Pandemik Covid-19: Cabaran Dan Impak Dalam Pendidikan Islam Dan Pembelajaran Murid [Covid-19 Pandemic: Challenges and Impact in Islamic Education and Student Learning]. *International Journal of Advanced Research in Islamic Studies and Education*, 1(1), 89-94.
- Ishak, R., & Rusman, S. N. F. (2018). Prestasi kerja guru dan hubungannya dengan faktor beban tugas, persekitaran kerja dan personal: Kajian kes di sebuah sekolah di Sabah. *JuPiDi: Jurnal Kepimpinan Pendidikan*, 5(1), 1-15.
- Ishar, M. I. M., Jamhari, A. A., Abd Razak, S. H., & Mohamad, N. A. K. (2020). Persediaan Rakyat Malaysia Dalam Merealisasikan Matlamat Revolusi Industri 4.0. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 5(10), 75-82. <https://doi.org/10.47405/mjssh.v5i10.510>

- Izhar, M. F., Abd Rahman, I. H., & Aziz, A. (2021). Pandemik Covid-19: pendekatan kerajaan Malaysia dalam mengurus keselamatan negara. *International Journal of Law, Government and Communication*, 6(26), 23-38.
- Ismail, Z. Z. (2018). Cabaran Industri Pembinaan Di Malaysia Terhadap Revolusi Industri 4.0
- Kamarudin, R., Jamil, A., Kamarudzzaman, A., Mohammad, A., Osman, N., & Mohd Isnani, Z. (2020). Penggunaan inovasi dgdocspace dalam pengurusan fail peribadi secara digital: kajian kes di Majlis Perbandaran Port Dickson (MPPD) (The use of dgdocspace in personal file management: a case study at Majlis Perbandaran Port Dickson (MPPD). *Jurnal Inovasi Malaysia (JURIM)*, 3(2), 26-41.
- Kamarudin, S. B., & Taat, M. S. (2020). Faktor tingkah laku pelajar, kekangan masa, beban tugas dan tekanan kerja dalam kalangan guru. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 5(9), 114-124.
- Kamarudin, S. B., & Taat, M. S. (2020). Pengaruh faktor-faktor tekanan kerja dalam kalangan guru di sekolah menengah: Satu analisis persamaan struktur (SEM-PLS). *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 5(11), 104-115.
- Khairul, W. M. (2021). Pengurusan Perubahan Dan Pengurusan Teknologi Serta Pengaruhnya Terhadap Pengintegrasian Teknologi Di Sekolah
- Long, A. (2018). Kerangka Rekod Dan Maklumat Elektronik Agensi Awam Di Malaysia: Kajian Kes Tentera Darat Malaysia
- Makhsin, M., Ping, T. Y., & Ismail, N. H. (2022). Standard Guru Malaysia 2.0 dalam kemenjadian jiwa pendidik. *International Journal of Education, Psychology and counselling (IJEPC)*, 7(46), 1-20.
- Malek, J. A., Boon, L. S., & Tahir, Z. (2022). Bandar Pintar Ubiquitous (U-City)-Konsep Dan Pelaksanaan Pembangunan Bandar Masa Hadapan.
- Manan, F. N. A., Hassan, N. S. A., Albasri, S. H., & Ab Ghani, M. N. (2021). Pendigitalan Operasi Kutipan dan Agihan Zakat dalam Mencapai Matlamat Pembangunan Mampan. *Jurnal Dunia Pengurusan*, 3(1), 87-95.
- Marzuki, N. A. A., Tahir, Z., & Nasri, N. M. (2020). Penguasaan Kemahiran Teknologi Komunikasi dan Maklumat (ICT) Terhadap Kecekapan Kerja. *e-BANGI Journal*, 17(9).
- Mat Yusoff, A. S., & bin Ali, A. H. (2018). Model Penerimaan Digital Dalam Kalangan Guru Di Malaysia. *International Journal of Education*, 3(8), 65-77. *International Journal of Education, Psychology and Counseling* eISSN: 0128-164X
- Martoatmodjo, G. W. (2023). Manajemen Perubahan Dalam Organisasi Pendidikan. *Primer : Jurnal Ilmiah Multidisiplin*, 1(2), 113–118. <https://doi.org/10.55681/primer.v1i2.58>
- Meerangani, K. A., Sharipp, M. T. M., Rosele, M. I., Hamid, M. F. A., & Razak, A. Q. A. (2021). Digitalisasi Sistem Pengurusan Zakat Di Malaysia: Potensi Dan Cabaran. *Journal of Business Innovation*, 6(1), 36.
- Ministry of Education Malaysia. (2013). *Malaysia Education Blueprint 2013 - 2025*. Retrieved from <https://www.moe.gov.my/menumedia/media-cetak/penerbitan/dasar/1207-malaysia-education-blueprint-2013-2025/file>
- Muhammad, R. (2018). Pembangunan Pusat Sumber Sekolah Maya Dan Penerimaannya Dalam Kalangan Guru-Guru Luar Bandar
- Muniandy, M., & Kutty, F. M. (2019). Impak beban tugas terhadap prestasi kerja guru di Maktab Rendah Sains Mara. *Jurnal Dunia Pendidikan*, 1(1), 9-17.
- Nawi, M. Z. M., & Shafie, A. R. M. (2021). Enhancing Efficiency of Record Booking Graphic Design CMN Global Consultant Ltd: Meningkatkan Kecekapan Merekod Tempahan Reka Grafik CMN Global Consultant Sdn. Bhd. *Management Research Journal*, 10(1), 58-76.

- Nazri, N. F. A. B. M. (2021). Kajian Terhadap Keberkesanan Penggunaan Sistem Pengurusan Aset (ASIS) di Hospital.
- Noor, N. A. Z. M., & Hasbullah, N. H. (2020). Sistem Temujanji Interaktif Berasaskan WEB. *Journal of Engineering, Technology & Applied Science*, 2(3), 110-117.
- NorAkmar, M. (2022). Pengaruh Kepimpinan Teknologi Pengetua Dan Efikasi Kendiri Guru Terhadap Penerimaan Teknologi Mudah Alih Di Sekolah Menengah Kebangsaan Negeri Kedah
- Nuin, N. F. M., Ambotang, A. S., & Salam, S. N. (2020). Pengaruh motivasi dan kompetensi terhadap perubahan pengurusan data murid di Sabah. *International Journal of Education, Psychology and Counselling*, 5(34), 116-125.
- Nur Aiman, Z. (2021). Peningkatan Persepsi Positif Amalan Pendokumentasian Pengurusan Sekolah dengan Menggunakan Sistem Aplikasi Google. *Jurnal Pengurusan dan Kepimpinan Pendidikan*, 34(1), 13-22.
- Hisham, N. H., Jobar, N. A., & Jamian, A. R. (2021). Persepsi Bakal Guru Terhadap Kerjaya, Peranan Dan Beban Tugas Profesion Perguruan Masa Kini (Teachers' Perception of the Current Career, Role and Tasks of the Teacher Profession). *Jurnal Pendidikan Bahasa Melayu*, 11(2), 26-38.
- Omar, I. M., Mamat, S., Sulaiman, S., & Ismail, N. A. (2021). Tahap pengetahuan teknologi, kemahiran dan penggunaan TMK dalam pengajaran dan pemudahcaraan Komsas guru Bahasa Melayu di Kelantan. *JuPiDi: Jurnal Kepimpinan Pendidikan*, 8(1), 47-60.
- Omar, M. N., Ismail, S. N., & Rathakrishnan, M. (2021). Penggunaan Teknologi Mudah Alih Bagi Menjana Pembelajaran Digital Semasa Perintah Kawalan Pergerakan (PKP). *International Journal Of Education, Islamic Studies And Social Science Research*, 6(1), 71-85.
- Perpustakaan Negara Malaysia. (2013). Dasar Pendigitalan Koleksi Perpustakaan. Retrieved from <https://www.pnm.gov.my/pnm/resources/UploadFile/Akta,%20Dasar%20dan%20Peraturan/GarisPanduanPendigitalan.pdf>
- Pelan Strategik Pendigitalan Sektor Awam 2021-2025. Portal Rasmi MAMPU. (2021). <https://www.mampu.gov.my/3dd-flip-book/pelan-strategik-pendigitalan-sektor-awam-2021-2025/>
- Rahman, R., Sakti, A. W., Widya, R. N., & Yugafiati, R. (2019, March). Elementary Education Literacy in the Era of Industrial Revolution 4.0. In *Second Conference on Language, Literature, Education, and Culture (ICOLLITE 2018)* (pp. 190-193). Atlantis Press.
- Ringkasan Eksekutif Pelan Strategik Pendigitalan Sektor Awam ... - mampu. (n.d.). <https://www.mampu.gov.my/wp-content/uploads/2021/02/Ringkasan-Eksekutif-Pelan-Strategik-Pendigitalan-Sektor-Awam-2021-2025-PSPSA-versi-Beta.pdf>
- Roetzel, P. G. (2019). Information overload in the information age: a review of the literature from business administration, business psychology, and related disciplines with a bibliometric approach and framework development. *Business research*, 12(2), 479-522.
- Rosli, M. F., & Nasir, M. K. M. (2022). Hubungan antara Kompetensi Guru dengan Motivasi Murid Untuk Belajar dalam Norma Baharu. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 7(3), e001373-e001373.
- Sabry, F. (2021). *Robotika Otonom: Bagaimana Robot Otonom akan ada di Sampul Majalah Time?* (Vol. 6). One Billion Knowledgeable.

- Salleh, M. A. M., Basir, K., Salman, A., & Omar, N. H. (2018). Media Sosial Dalam Transformasi Sistem Penyampaian Dan Kualiti Maklumat Kolej Kediaman. *Prosiding Konvensyen Kepengetuaan dan Felo Penghuni Kolej Kediaman Universiti Awam Kebangsaan 2018*.
- Sa'ari, H., Idrus, M., Zainuddin, I. N., Idris, S. R. A., Faizal, M., & Ramsi, M. (2018). The influence of librarians' opportunity recognition in demonstrating innovative behavior in Malaysia higher education sector. *Int. J. Learn. Teach*, 4(1), 83-87.
- Saro, N., Bhari, A., & Rani, A. M. (2022). Aplikasi Pendigitalan Dalam Pengurusan Kewangan Dikalangan Institusi Pengurusan Zakat Di Malaysia. *Management*, 7(26), 32-42.
- Shamsudin, I. H., Mokhtar, U.M., & Baharuddin, M. S. (2020). Electronic Records Management At The Governance And Administration Division, Universiti Kebangsaan Malaysia. *Asia-Pacific Journal of Information Technology and Multimedia*, 9(2), 25-34.
- Sharipah Khadijah binti S. Hashim, & Hasnieza binti Mokhtar. (2022). Kajian Keberkesanan Penggunaan Projek Inovasi Sistem Invenmed Dalam Pengurusan Inventori Ubat-Ubat. *Journal of STEM and Education*, 1(1), 23-37. Retrieved from <http://mmbrf.com/ojs/index.php/pkb/article/view/7>
- Siron, R. (2022). Implikasi Pandemik COVID-19 terhadap penjanaan sisa pepejal semasa perintah kawalan pergerakan di Semenanjung Malaysia. *Akademika*, 92(1), 179-194.
- Spante, M., Hashemi, S. S., Lundin, M., & Algers, A. (2018). Digital competence and digital literacy in higher education research: Systematic review of concept use. *Cogent Education*, 5(1), 1519143.
- Spante, M. (2018). Organizing digitalization in school: How a municipality in Sweden arranged for new curriculum implementation emphasizing digitalization. In *The proceedings of the International Conference on Information Communication Technologies in Education (ICICTE)* (pp. 382-390).
- Sprague Jr, R. H. (1995). Electronic document management: Challenges and opportunities for information systems managers. *MIS quarterly*, 29-49.
- Sulaiman, J. B. (2022). Pengaruh Pembangunan Profesionalisme Berterusan Sebagai Mediator Terhadap Hubungan Antara Kompetensi Profesional Guru dan Kemahiran Abad ke 21 Guru Sekolah Menengah TS25.
- Sulasmu, E. (2022). Primary school teachers' digital literacy: An analysis on teachers' skills in using technological devices. *Journal of Innovation in Educational and Cultural Research*, 3(2), 140-145. doi:<https://doi.org/10.46843/jiecr.v3i2.81>
- Timbang, M., & Ambotang, A. S. (2020). Pengaruh Inovasi Teknologi, Peranan Pentadbir dan Kesiapan Guru Terhadap Profesionalisme Keguruan Sekolah Luar Bandar di Sabah. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 5(2), 96-106.
- Van Wart, M., Roman, A., Wang, X., & Liu, C. (2019). Operationalizing the definition of e-leadership: identifying the elements of e-leadership. *International review of administrative sciences*, 85(1), 80-97.
- Van Wart, M., Ni, A., Rose, L., McWeeney, T., & Worrell, R. (2019). A literature review and model of online teaching effectiveness integrating concerns for learning achievement, student satisfaction, faculty satisfaction, and institutional results. *Pan-Pacific Journal of Business Research*, 10(1), 1-22.
- Vallo Hult, H., & Bystrom, K. (2022). Challenges to learning and leading the digital workplace. *Studies in Continuing Education*, 44(3), 460-474.
- Vallo Hult, H. (2021). *Digital Work: Coping with Contradictions in Changing Healthcare* (Doctoral dissertation, University West).

- Wigati, I., & Lestari, W. (2023). Community Resistance to Online Learning Policies During Covid-19 Pandemic in Education. *Pedagogia: Jurnal Pendidikan*, 12(1), 1-14.
- Yahya, S. M. A. S., & Jusoh, M. A. (2021). Penilaian Kepuasan Pengguna terhadap e-Claim. *International Journal of Accounting*, 6(34), 73-93.
- Yusuf, Y., & Jamaludin, K. A. (2022). Cabaran Perubahan Pendekatan Pengajaran dan Pembelajaran dalam kalangan Guru, Ibu Bapa dan Murid Semasa Perintah Kawalan Pergerakan (PKP). *Jurnal Dunia Pendidikan*, 4(3), 120-133.