

The Role of Information Gathering on Teachers' Digital Learning Agility

Kamilah Abdullah, Mas Nida Md. Khambari*, Su Luan Wong, Noor Syamilah Zakaria, Nur Dania Mohd Rosli, Priscilla Moses, Nur Aira Abdrahim and Mohd Najwan Md. Khambari

Abstract—This study explores the pivotal role of proactive information gathering in developing teachers' Digital Learning Agility (DLA) within the context of contemporary education. Through qualitative interviews, observational data, and photographs collected from Malaysian schools, the research highlights how teachers engage in two primary types of information gathering: first, insights gained from attending webinars and workshops aimed at effectively utilising digital tools; and second, technical information derived from monitoring students' attendance and participation in the classroom. The findings reveal that effective data utilisation not only empowers educators to make informed decisions but also fosters a culture of data-driven decision-making that is essential for improving student engagement and learning outcomes. Furthermore, the support from school administrators and the collaborative involvement of parents are identified as critical factors that strengthen this process. By embracing data-informed approaches, teachers can create dynamic, student-centred learning experiences that are crucial for success in the digital age. This study underscores the necessity for educational institutions to prioritise the development of DLA among teachers, ensuring they are well-equipped to navigate the complexities of modern education.

Index Terms—Digital Learning Agility, Educational Technology, Information Gathering, Malaysian Education

I. INTRODUCTION

The digital revolution in education has greatly impacted teachers' roles and responsibilities. To effectively navigate this evolving landscape, educators must cultivate their Digital Learning Agility (DLA). DLA is defined as the ability and willingness of educators to actively seek out, assimilate, and apply knowledge and skills related to digital tools and pedagogical strategies, enabling them to adapt to the rapidly changing educational environment [1]. This agility allows teachers to embrace new technologies and pedagogical techniques that extend beyond traditional classroom settings [2].

A critical skill for educators in this context is information gathering on digital tools. By honing their information-gathering skills, teachers can enhance their instructional practices while simultaneously empowering students to utilise technology effectively. This dual focus is essential for meeting the ever-evolving demands of modern

education settings [3][4]. Lifelong learning is more important than ever as educators must continuously refine their skills to create engaging and effective learning environments in the digital age. The connection between effective information gathering and the changing requirements of the 21st-century workforce underscores the importance of developing DLA among teachers.

In this study, we will explore the concept of Learning Agility (LA), as introduced by Hoff and Burke in 2018 [5], and discuss its relevance to DLA. Hoff and Burke highlight that information gathering is a key dimension of LA, essential for individuals to adapt to new challenges in an ever-changing environment. While LA refers broadly to adaptability across various contexts, DLA focuses on the education sector's unique challenges related to digital tools and pedagogical strategies. Building on Hoff and Burke's concept of Learning Agility (LA), DLA emphasises the need for educators to stay current with technological advancements, such as AI in adaptive learning and educational big data. These technologies redefine the boundaries of how information can be utilised to enhance teaching efficacy and student engagement.

In the context of DLA, information gathering involves teachers actively seeking new knowledge, feedback, and insights on digital teaching and learning from a variety of sources. As Khambari et al. assert, DLA equips teachers to remain adaptable, recognise patterns in their evolving digital classrooms, and make informed decisions [1]. Moreover, by actively seeking information on digital teaching and learning, educators can stay abreast of the latest innovations, helping students develop critical skills such as creativity, programming, and digital technology integration—all of which are in high demand in today's workforce [4]. However, research in Malaysia reveals a gap in teachers' use of digital technologies, limiting their ability to fully utilise these tools in education [2][6][7][8]. Thus, developing DLA is crucial for teachers to adapt to rapid technological changes, enabling them to integrate new digital tools effectively and foster innovation, ultimately enhancing student achievement.

Despite various initiatives such as Malaysia's Digital Education Policy and targeted programmes aimed at improving digital literacy, many teachers still lack the confidence and capacity to incorporate digital tools into their practices [7]. This challenge is not unique to

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Kamilah Abdullah is a Ph.D. student at Universiti Putra Malaysia, and currently a recipient of the Program Hadiah Latihan Persekutuan (HLP) scholarship. (gs61357@student.upm.edu.my).

Mas Nida Md. Khambari is the corresponding author and an Associate Professor at Faculty of Educational Studies at Universiti Putra Malaysia. (e-mail: khamasnida@upm.edu.my).

Su Luan Wong currently holds the position of Professor at the Faculty of Educational Studies, Universiti Putra Malaysia. (email: suluan@upm.edu.my)

Noor Syamilah Zakaria is an Associate Professor at the Department of Counselor Education and Counseling Psychology, Faculty of Educational Studies, Universiti Putra Malaysia. (email: syamilah@upm.edu.my)

Nur Dania Mohd Rosli is a MSc. Student of Faculty of Educational Studies, Universiti Putra Malaysia. (email: daniarozie@gmail.com)

Priscilla Moses is an Associate Professor and Head of Programme (PhD in Education) at the Faculty of Creative Industries, Universiti Tunku Abdul Rahman. (email: priscilla@utar.edu.my)

Nur Aira Abdrahim is a Senior Lecturer at Department of Professional Development and Continuing Education, Faculty of Educational Studies of Universiti Putra Malaysia. (email: nuraira@upm.edu.my)

Najwan Khambari is currently a senior lecturer at the Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka (email: najwan@utem.edu.my)

Malaysia; it reflects a global trend where many educators still do not adequately utilise digital devices in their classrooms [9][10][11]. This situation emphasises the need for systematic training and support to bridge gaps in digital literacy and effective pedagogical integration [12][13]. Information gathering, a critical component of DLA, ensures that teachers remain informed about current digital practices and innovations, leading to improved student engagement and learning outcomes. Therefore, understanding the role of information gathering in developing teachers' DLA is an important area that needs further exploration.

II. LITERATURE REVIEW

The process of information gathering is a critical skill that plays a vital role in enhancing teachers' DLA. In an educational landscape marked by rapid technological advancements and diverse student needs, the capacity to efficiently gather and apply information is essential for effective teaching. Hoff and Burke emphasise the critical importance of information gathering in promoting individual LA within organisational contexts. This concept is equally of great importance for teachers in educational organisations, who must constantly adapt their teaching methods to effectively integrate emerging technologies, tools, and pedagogical strategies.

While Hoff and Burke identify information gathering as a key dimension of LA, the rapid development of technologies like AI and big data analytics has transformed how teachers gather, interpret, and apply information. Adaptive learning technologies, for instance, use AI to offer personalised learning experiences, empowering teachers to make data-informed decisions that align with modern pedagogical needs. Recent studies indicate that AI-driven tools, like adaptive learning platforms and automated feedback systems, empower teachers by offering personalised insights into student performance [60]. These technologies enhance the teaching experience and facilitate a more tailored approach to education, allowing educators to respond to individual student needs effectively [60]. Similarly, educational big data facilitates data-driven decision-making, allowing educators to design more effective pedagogical strategies [61]. The integration of these technologies demonstrates how DLA must evolve to include skills for analysing and interpreting large datasets [62]. This evolution is crucial for ensuring relevance in today's educational landscape, as educators increasingly rely on data analytics to inform their instructional practices and improve student outcomes [63].

The importance of information gathering within the field of education is paramount. Effective information gathering provides teachers with access to a variety of digital resources, professional networks, and best practises that enhance their ability to meaningfully integrate technology into their classrooms [14][15]. When educators proactively seek out relevant knowledge, they are able to assemble high-quality resources that meet their pedagogical goals. This process not only improves their technical skills, but also fosters the flexibility needed to adapt to changing digital trends and the diverse needs of their students. Graça et al. argue that effective information gathering enables teachers to implement a more dynamic and adaptive teaching approach, allowing for the exploration of innovative pedagogical strategies that can significantly improve student engagement and learning outcomes [16].

Furthermore, the process of gathering information allows teachers to develop learning environments that are rich in technology. Alam and Mohanty observe that educators who actively incorporate new knowledge into their teaching methodologies are better equipped to develop engaging and interactive classroom [17]. This flexibility is essential because it allows teachers to respond to the ever-changing nature of education and the different learning styles of their students.

The importance of gathering information in this context goes beyond simply collecting data. It is about turning that data into actionable insights that can improve teaching practises and enhance the learning experiences of students.

In addition to improving technical skills and adaptability, information gathering also plays a crucial role in fostering a culture of continuous learning among teachers. By keeping up to date with the latest pedagogical research and advances, teachers can evaluate and refine their teaching practices. This reflective practice not only improves their adaptability to new educational scenarios and technologies [16], but also positions them as facilitators of digital literacy for their students. By guiding students in the use of digital resources, teachers play a crucial role in the development of students' own digital competencies, making information gathering an essential part of both teachers' and students' development. This reciprocal relationship emphasises the importance of fostering DLA in teachers, as it ultimately contributes to a more digitally literate student body.

However, the sheer amount of digital content available can be challenging for teachers. Many teachers struggle to find authentic, educationally meaningful resources in the vast array of information available. This highlights the need for teachers to develop critical information literacy skills so that they can effectively assess the authenticity, reliability, and relevance of digital materials. As Pečiuliauskienė et al. note, understanding the nuances of information gathering is essential for teachers to make informed decisions about integrating technology into their classrooms [18]. These skills are critical to promoting digital literacy, not only for teachers themselves, but also for their students, as teachers model effective information-gathering strategies.

The continuous gathering of information is crucial for teachers in lower and secondary education as it enables them to stay informed about the latest educational research and advancements. This ongoing engagement encourages educators to critically evaluate and refine their teaching methodologies, thereby enhancing their adaptability to new educational scenarios and technologies. Such reflective practices are essential for fostering DLA among educators, which ultimately contributes to the development of a more digitally competent student body [19][20]. The reciprocal relationship between teacher and student learning emphasises the necessity of promoting DLA among teachers, as it directly impacts students' ability to navigate a digital world effectively [21][22].

Furthermore, integrating information gathering into classroom practices fosters a sense of community among teachers in lower and secondary schools. By sharing insights and resources with colleagues, educators can collaboratively enhance their DLA, creating a supportive learning environment that benefits both teachers and students. This collaborative approach not only enriches teaching practices but also exposes students to diverse perspectives and methodologies, which is vital for developing their critical thinking and problem-solving skills [23]. Research indicates that such collaborative efforts significantly improve teachers' adaptability and enhance student engagement and learning outcomes [24].

In brief, the role of information gathering in developing teachers' DLA is indispensable in lower and secondary education contexts. By equipping educators with the necessary resources and insights to adapt their teaching practices to the digital age, information gathering fosters flexibility, creativity, and innovation in the classroom [25]. The existing literature emphasises that effective information gathering is crucial for teachers to navigate the complexities of modern education, ultimately leading to substantial improvements in both teaching practices and student learning outcomes [26].

In conclusion, the ability to gather and use information effectively

is not just a skill but a necessity for teachers in the digital age. It enables them to create engaging, responsive, and effective learning environments that cater to the diverse needs of their students. As teachers embrace the challenges and opportunities presented by technology, the importance of information gathering in developing their digital learning agility will continue to grow. This is important not only for teachers' career growth but also for the overall improvement of educational practices and student success.

III. RESEARCH METHODOLOGY

The study operationalises DLA by focusing on the measurable behaviour of information gathering. This dimension was selected due to its critical role in enabling educators to adapt to the dynamic digital landscape. Information gathering encompasses teachers' ability to actively seek, analyse, and apply relevant digital resources and knowledge in their educational practices.

To capture this behaviour, the study used qualitative methods, including semi-structured interviews and observational data. Qualitative case studies allow for an in-depth understanding of specific contexts and phenomena, which is essential when examining the multifaceted interactions between teachers, technology, and educational practices [27]. This methodology enables the researcher to gather rich, descriptive data that can illuminate the experiences and perceptions of participants, thus providing insights into the challenges and successes faced by educators in adapting to digital learning environments [28]. While quantitative methods could provide broader generalisability, the qualitative approach aligns with the study's goal of gaining in-depth insights into individual and systemic behaviours in educational contexts.

Prior to conducting the study, ethical approval was obtained from the university's ethics committee and the Education Policy Research and Development Division under Malaysia's Ministry of Education (ERPD). This approval is vital as it ensures that the research adheres to ethical standards, protecting the rights and welfare of participants [29]. Additionally, informed consent was obtained from all participants, which is essential for ethical research practices, fostering trust and transparency in the research process [30]. To mitigate potential biases during data collection and analysis, the researchers remained reflexive, documenting their positionality and its potential influence on the research process. Participants were assured of their anonymity, and care was taken to avoid leading questions during interviews.

The research focuses on three distinct groups of participants: teachers (both primary and secondary), school administrators, and parents. This triadic approach is crucial as it captures a holistic view of the educational ecosystem. Teachers provide firsthand accounts of their experiences with digital learning, while school administrators offer insights into institutional policies and support systems. Parents, on the other hand, can share their perspectives on their children's learning experiences and the effectiveness of digital tools from a home environment [31]. By including these diverse voices, the study aims to create a comprehensive understanding of the role of information gathering on teachers' digital learning agility.

Data collection methods for teachers include observations of school digital preparedness, semi-structured interviews, and photographs documenting their use of technology in teaching. Observational data is critical for assessing the actual digital infrastructure and resources available in schools, which directly impacts teachers' ability to engage in effective digital learning. Semi-structured interviews allow for flexibility in exploring participants' thoughts and feelings, while photographs serve as visual evidence of teachers' practices and the learning environment [32]. For school administrators and parents,

semi-structured interviews were employed to gather their insights and experiences, which are equally important for understanding the broader context of digital learning agility [33]. The strength of this approach lies in its ability to utilise multiple sources of evidence, which enhances the validity and reliability of the findings [32][34].

This study utilised purposive sampling, a method appropriate for qualitative research, as it enables the selection of individuals who are particularly knowledgeable or experienced regarding the research topic [35]. Participants included ten primary and ten secondary school teachers, five school administrators, and twenty parents, ensuring representation across Malaysia's diverse educational regions. Teachers were chosen based on their years of teaching experience, ranging from novice to veteran educators, and their active involvement in digital learning during the COVID-19 pandemic. This criterion was essential for capturing practical insights into the integration of digital tools during a period of significant educational disruption.

Meanwhile, five school administrators were selected based on their leadership experience, particularly during the transition to online teaching during the COVID-19 pandemic, which is crucial for understanding the administrative support provided during this critical period [36]. Additionally, twenty parents were included based on their active involvement in facilitating their children's online learning, providing insights into the home learning environment [37].

Although the sample size may appear modest, its carefully planned geographical distribution and inclusion of multiple stakeholders ensure a comprehensive understanding of Digital Learning Agility (DLA) development. To achieve representativeness and inclusivity [38], participants were selected from five distinct geographical zones across Malaysia, reflecting the country's diverse educational landscape. These zones include Central (Kuala Lumpur, Selangor, Putrajaya), North (Perlis, Kedah, Penang, Perak), South (Johor, Negeri Sembilan, Malacca), East Coast (Kelantan, Terengganu, Pahang), and East Malaysia (Sabah, Sarawak, Labuan). This geographical diversity not only enriches the findings but also ensures that the perspectives of various regions are equitably represented. Table 1 provides a detailed summary of the number of teachers, school administrators, and parents involved in interviews based on their location and zones.

TABLE I
NUMBER OF TEACHERS, SCHOOL ADMINISTRATORS, AND PARENTS INVOLVED IN INTERVIEWS BASED ON THEIR LOCATION AND ZONES

Location	Peninsular/ West Malaysia				East Malaysia	Total
Zone	Central	North	South	East Coast		
Primary School Teachers	2	2	2	2	2	10
Secondary School Teachers	2	2	2	2	2	10
School Administrators	1	1	1	1	1	5
Parents	4	4	4	4	4	20
	Total					45

Consent forms were distributed to all participants prior to the data collection. Once consent was obtained, the researchers scheduled visits to schools for data collection. The first step involved observing the school's digital preparedness using an observation checklist adapted from Chanyagorn and Kungwannarongkun's ICT Readiness Assessment Model [39], which is effective for evaluating digital readiness in educational settings. This assessment is crucial as it provides a baseline understanding of the resources available to

teachers [40]. To achieve the objective of this study, three components from the observational checklist were selected. These components, which were deemed important in supporting teachers' information gathering, were: (i) personal devices, (ii) staff education and encouragement, and (iii) the use of public servers. Following the observations, semi-structured interviews were conducted, with questions adapted from Hoff and Burke's work on learning agility, ensuring relevance to the study's context [35]. Prior to this, the validity of the interview protocol was rigorously checked and validated by expert panels to ensure they accurately capture the participants' experiences and perceptions [27]. Additionally, photographs were collected from participants who consented to visually document their engagement with technology in teaching. This approach provides additional context to the qualitative data. Each of these steps is vital for ensuring a comprehensive understanding of the role of information gathering on teachers' digital learning agility, as they collectively contribute to a rich dataset that reflects the complexities of the educational environment. Figure 1 illustrates the data collection process.

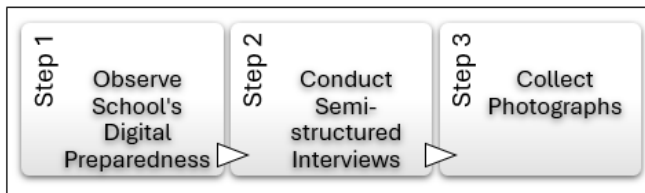


Fig. 1. Data collection process for primary and secondary school teachers.

For school administrators and parents, individual interviews were conducted after obtaining their consent. The interview questions were tailored to their specific roles in the educational process. The voices of school administrators are essential as they provide insights into the policies and support structures that facilitate or hinder teachers' digital learning agility [41]. Similarly, parents' perspectives are crucial for understanding the impact of digital learning on students' home experiences and their overall educational journey [42]. Each step in this process is significant as it ensures that the research captures a wide array of experiences and insights, thus enriching the overall findings and implications of the study [43].

To ensure credibility, member checking was conducted by sharing interview transcripts and preliminary findings with participants to confirm the accuracy of interpretations. Additionally, triangulation of data sources, including interviews, observations, and photographs, ensured a robust understanding of the phenomenon. The analysis of the data collected through the observation checklist, interview transcripts, and photographs was managed using Atlas.ti to facilitate systematic coding and thematic analysis [43]. The use of thematic analysis facilitated the identification of patterns and themes within the data, which are essential for understanding the complex dynamics of information gathering in digital learning environments [43]. The analysis followed a four-stage process.

The first stage involved transcribing interviews into text format and entering them into Atlas.ti for organisation and analysis [35]. The second stage required multiple readings and writing memos of the transcripts and observational data to familiarise the researcher with the content. This allows for the identification of emergent themes and ideas [44]. The third stage involved coding the data and developing categories and themes, which is essential for organising the data into meaningful segments that reflect the participants' experiences [35]. The final stage involved synthesising the findings into coherent interpretations regarding the role of gathering information on teachers' digital learning agility, which is critical for drawing meaningful

conclusions from the research [45]. To respect the participants' privacy and as human subjects safeguarding, their names were coded, ensuring confidentiality and adherence to ethical standards [46].

IV. FINDINGS AND DISCUSSION

This study's findings demonstrate the role of information gathering in teachers' DLA development, discussed in two significant sub-themes: (i) Information Gathering for Effective Digital Learning, and (ii) Enhancing Teaching Through Data Utilisation. The discussion shall begin with the first sub-theme that shows how information gathering promotes teachers to actively participate in continuous learning and used a variety of technologies to improve their digital competencies and teaching strategies. The second sub-theme, emphasises on the role of gathering data and strategically applying them to improve teaching methods, promote student engagement, and foster a good learning environment.

A. Information Gathering for Effective Digital Learning

This study investigates the role of information gathering in developing teachers' DLA. One of the sub-themes emerged from the study is the role of information gathering in fostering effective digital learning among teachers. This connection highlights how effective information gathering not only supports teachers' growth but also directly influences their ability to implement digital learning strategies. Overall, this section discusses the necessity of fostering a culture of information gathering among teachers to enhance their DLA and improve student outcomes.

Observational analysis on two components from the observational checklist which the researchers interpreted as important in supporting teachers' information gathering which are: (i) personal devices and (ii) staff education and encouragement found that personal devices play a crucial role in enhancing teachers' ability to gather information effectively. By providing immediate access to a wealth of online resources, personal devices enable educators to stay updated with the latest developments in digital learning tools and pedagogical strategies. In addition to the availability of personal devices, staff education and encouragement contributes to fostering proactive information-gathering behaviours among teachers. By educating and encouraging teachers to get involved in programs that highlight the importance of digital literacy and information gathering encourage teachers to actively seek out new knowledge and skills.

Based on the data analysis of the observation checklist of the school's digital preparedness in Table 2, it is evident that teachers are prepared to gather information on digital learning as they are all equipped with personal devices which they acquire on their own expenses. Furthermore, it is also evident that staff education and encouragement in expanding knowledge on digital technologies are present in the schools. After observing the schools' digital preparedness, it became evident that further insights from teachers were needed to further understand their approaches to information gathering. Thus, the data is then triangulated with the interview transcripts and photographs that were collected.

TABLE II

THE SUMMARY OF SCHOOLS' DIGITAL PREPAREDNESS OBSERVATION OF PERSONAL DEVICES AND STAFF EDUCATION AND ENCOURAGEMENT

Schools' Digital Preparedness	Notes
Personal Devices	Teachers are equipped with personal devices, which were purchased at their own expense. These devices vary in types and capabilities based on individual buying ability, including laptops, tablets, and other personal technologies. The devices also differ in specifications like RAM capacity, screen size, etc. This variety reflects the teachers' differing financial capabilities but highlights their proactive efforts to stay digitally prepared.
Staff Education and Encouragement	Schools actively encourage teachers to participate in both online and in-person seminars to develop their digital skills. These efforts include promoting webinars, workshops, and other professional development activities that focus on enhancing the teachers' proficiency with digital tools and teaching methods. This support helps ensure that teachers remain current with digital trends and educational technologies, fostering a culture of continuous learning and professional growth.

In the interviews, it was highlighted that participants, using their own personal devices, embraced a variety of tools to keep informed with technological developments and understood the need of lifelong learning. For instance, Teacher 1, who was a secondary school teacher at the time this study was conducted, emphasised the importance of information gathering by attending webinars and exploring online resources in developing their DLA.

“Oh, yes, I’ve attended some webinars on YouTube, though not many (of the webinars were) related to teaching but more focused on educational management. For example, (the webinars were) on improving the school’s reporting system for administrators, enhancing student feedback mechanisms, creating Google Forms, and similar tasks. I’ve explored online resources to gain knowledge on how to approach these matters.” (Teacher 1)

This highlights how crucial it is for teachers to continue gathering information in order to improve their digital knowledge and methods of teaching. The excerpt shows that teachers actively looked for different resources, realising how important it is to keep up with technology developments. Their proactive involvement was demonstrated by their attendance at webinars and their investigation of online resources, where they learnt about important subjects including digital tool development and instructional management. Through the adoption of these materials, teachers set themselves up for success by becoming more adaptable to the changing nature of education. Figure 2 is shared by Teacher 1, showing the personal devices owned by the teacher and how the devices were utilised to attend an online workshop on developing teachers’ knowledge on digital teaching and learning, aligning with the proactive information-gathering practices discussed earlier.



Fig. 2. Teacher 1 using personal devices to attend an online workshop for teachers.

Looking at the teachers’ effort in gathering information to enhance their knowledge on digital teaching and learning, it is important to point out that teachers can create dynamic, student-centred learning experiences by staying up to date on pedagogical trends, evidence-based practices, and emerging technologies [47]. In addition, the culture of proactive information gathering fosters an educational atmosphere that values readiness, adaptability, and a strong commitment to ongoing progress and professional mastery [48][2]. Simply put, information gathering entails proactive teaching preparation, in which teachers actively seek out resources and professional development opportunities to improve their skills, as well as data-informed teaching, which uses data insights to tailor instructional strategies and effectively address student needs.

In another interview, Teacher 2, who was a primary school teacher when the study was conducted, echoed similar idea and shared in the interview,

“Absolutely. When discussing innovation, gadgets, and tools, my focus is primarily on apps that can aid teaching. I search for information about digital technology on various websites. There are numerous platforms available. Occasionally, I even explore TikTok. Contrary to its reputation solely for dancing, TikTok also offers informative content, including video tutorials on design and photography techniques. Thus, we endeavour to stay updated across all facets, not just limited to teaching.” (Teacher 2)

Teacher 2’s statement highlights that through information gathering, teachers made informed decision and used alternative platforms, including TikTok, to obtain resources and learning materials. This creative method of obtaining resources emphasises how important it is to diversify sources of knowledge to improve teaching strategies. Teachers who are open to trying out different platforms show that they are digitally agile by being more aware of the different ways that students learn. Figure 3 is one of the examples shared by Teacher 3 who utilises TikTok to gather relevant information for his teaching content.

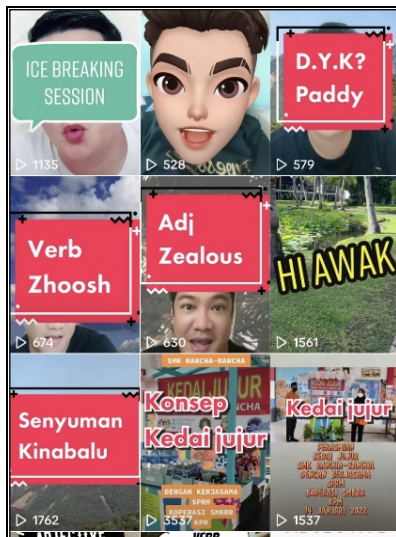


Fig. 3. Screen capture of a TikTok page account that were utilised by Teacher 3 to gather information for his teaching and learning sessions.

In today's quickly changing educational world, teachers must actively engage in continuous learning and use a variety of tools to improve their digital capabilities and teaching practice [49]. Recognising the necessity of staying current with advances in technology encourages a culture of lifelong learning and professional development, ensuring that teachers remain at the forefront of their discipline. Furthermore, teachers can actively seek for knowledge and teaching aids on numerous websites, especially unconventional platforms that provide video tutorials on design, photographic skills, and other related topics [50]. Thus, it is evident that information gathering plays a vital role in developing teachers' DLA by promoting creativity and resourcefulness among teachers by allowing teachers to include unique and interesting features into their classes.

The findings also underscore the potential of AI-driven adaptive learning platforms in enhancing teachers' ability to gather relevant digital information [64]. Participants who demonstrated high DLA were often those who used such tools effectively, suggesting a need for broader adoption in the professional development programs [65].

While individual efforts in information gathering are crucial, collaborative support from administrators and parents further strengthens teachers' ability to adapt to digital learning environments. In line with the data analysis from the observation checklist, the interviews highlight the collaborative nature of teachers' DLA development through the staff education and encouragement. In the following interviews, it is evident that administrators and parents highlights the importance of pursuing outside assistance and direction. School Administrator 1 acknowledged the need for teachers to gather information by seeking external support and stated that,

"Yes, it's crucial. Not all knowledge can be grasped independently. It also varies depending on an individual's capacity. While some may excel at learning through YouTube or online searches, certain concepts require guidance from others. Hence, it's essential to take the initiative and seek assistance when encountering such challenges." (School Administrator 1)

Reinforcing this perspective, Parent 1 suggested,

"I believe teachers should continuously expand their knowledge by participating in courses, including online

ones. Perhaps the Ministry of Education could assemble experienced or proficient teachers in digital technology to create recorded videos covering all subjects and chapters, which could then be uploaded to a central portal. This resource would be accessible to both teachers and parents, extending learning beyond school hours. Users could watch the videos, access handouts, notes, and quizzes. This initiative holds significant potential to benefit everyone involved." (Parent 1)

These interview excerpts show that the school administrators and parents are aware that everyone has different capacity for self-learning. When faced with digital issues, it is critical to understand that not all knowledge can be acquired independently, and that individuals' capacities for self-learning may differ. According to Sandar and Kálmán, administrators must empower teachers to seek the help they require by building a culture of collaboration and shared learning [51]. Furthermore, the idea put forth by parents was to create a single site with resources and recorded classes to enable learning to continue outside of regular school hours. On the other hand, school administrators are encouraging teachers to gather information through external support. This group's effort to assist teachers in their DLA development is indicative of a common goal of raising the standard of education and improving student results, which in turn promotes an environment in which education is continuously improving.

To summarise, these findings not only highlight the role of proactive information gathering but also underscore the need for ongoing support and resources at both institutional and community levels. It is now clear that by engaging in continuous information gathering by attending relevant webinars, investigating varied knowledge sources, and seeking external support and guidance, the educational community may foster an environment that promotes adaptation, innovation, and commitment to excellence. This strategy not only facilitates teachers' DLA development but also fosters a feeling of purpose and lifelong learning among teachers, ultimately boosting students' academic and personal growth.

B. Enhancing Teaching through Data Utilisation

Another sub-theme that emerged from this study is enhancing teaching through data utilisation. In addition to collecting data to enhance teachers' understanding of how to effectively use digital tools, participants expressed enthusiasm during the interviews about gathering technical information, such as students' attendance and participation in the classroom. They acknowledged that data plays a crucial role in identifying areas needing development and in customising their teaching methods accordingly.

Building on this, the notes from the school's digital preparedness observation were analysed. A crucial component identified was the use of public servers. In most Malaysian schools, public servers, provided through government initiatives or external cloud platforms, serve as a cost-effective and scalable solution for managing technical data that was collected by teachers. These servers are instrumental in supporting teachers' data collection processes, enabling them to store and access critical resources, such as student records and teaching materials. By utilising centralised public servers, schools ensure that these resources remain consistently available without the need for extensive IT infrastructure. Table 3 summarises the data analysis based on observations and notes on public server usage during the school visits.

TABLE III
THE SUMMARY OF SCHOOLS' DIGITAL PREPAREDNESS OBSERVATION OF
PUBLIC SERVER

Schools' Digital Preparedness	Notes
Public Server	Most schools that were observed throughout this study lack the resources or infrastructure for private servers. Instead, they rely on public servers provided by government or external cloud platforms to store and manage data, supporting their digital infrastructure.

The analysis of the school's digital preparedness checklist demonstrated that teachers are well-prepared to gather and use digital learning data effectively, largely due to the accessibility of public servers. To gain further insight into teachers' data gathering methods, we triangulated this information with interview transcripts and photographs collected during the school visits. In the interviews, it was highlighted that the teachers actively collecting technical data to make informed decisions. For instance, Teacher 4, who was a secondary school teacher when the study was conducted, reflected on her utilisation of data and shared,

“When students submit their work to us, we assess it and duly record their attendance. However, I often find that I don't utilise this data effectively for planning my next steps. Essentially, I only have insight into how frequently a student attended and any reasons for their absence. Occasionally, for those with perfect attendance, we acknowledge their dedication by offering small tokens of appreciation when the new term commences; it's a way of recognising their consistent efforts.” (Teacher 4)

Despite Teacher 4's recognition that she does not fully utilise the data she collects, she acknowledges the critical role of data utilisation in shaping effective teaching practices and enhancing student engagement in today's educational landscape [52][53]. By systematically collecting and analysing various data points—such as student work submissions, attendance records, and performance metrics—teachers can gain valuable insights that could inform their instructional decisions.

Research indicates that data-driven decision-making (DDDM) is essential for identifying areas needing improvement and tailoring teaching strategies to meet the diverse needs of students [54]. This proactive approach not only fosters a culture of data-driven decision-making in education but also plays a vital role in developing teachers' DLA. DLA enables teachers to remain flexible and responsive to new challenges, ensuring that they can integrate innovative digital tools and practices into their classrooms [55]. Ultimately, fostering a culture of data-driven decision-making enhances instructional methods and promotes improved educational outcomes, equipping students with the skills necessary for success in the 21st century [56]. Teacher 5, who was a primary school teacher when the study was conducted, further acknowledged the benefits of gathering technical data and shared,

“Indeed, it has proven to be quite helpful and much more efficient. The data is systematically organised, making it easy for me to track which students have engaged with the lessons. I maintain a checklist for reference. While it's possible to do this manually during physical classes, it's far more time-consuming—printing out documents and checking them one by one. With digital teaching, I can access this information instantly, generated directly from the platforms.” (Teacher 5)

To further support her statement, Teacher 5 shared an example of online work collected from her students (Figure 4), where she then utilised it to track students' comprehension and engagement. The screen capture portrays students' work on Padlet where different student uses different colours for their digital stick-on-notes. Teacher 5 then used the screen capture so that she could track students who actively participated in the lesson and analyse their understanding.

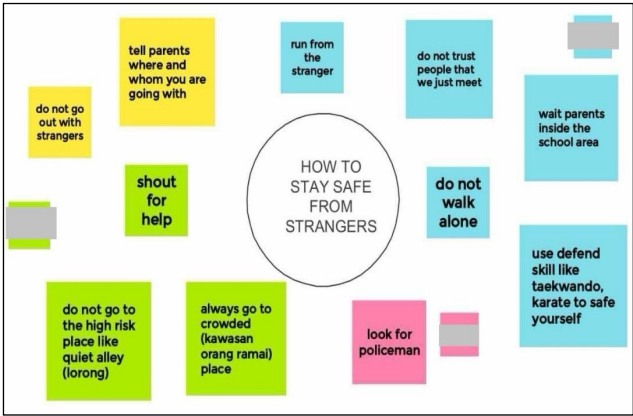


Fig. 4. Screen capture of a Padlet page that is used by Teacher 5 to gather students' work.

According to research on data-driven decision-making, teachers must recognise the significance of effectively utilising data gathered from student work submissions and attendance records to plan their subsequent actions and identify areas for development [57]. Using this vital information, teachers may guarantee that their teaching approaches are matched to their pupils' individual requirements, ultimately fostering academic success. Furthermore, using systematic data to evaluate student involvement with lessons provides teachers with a useful reference checklist for tracking progress and finding areas for improvement. This strategy encourages efficiency and effectiveness in teaching processes, allowing teachers to make informed judgements and customise instruction accordingly [58]. Embracing a data-informed teaching strategy allows educators to improve the quality of their instruction, create a supportive learning environment, and encourage students to reach their full potential.

Agreeing with this perspective, school administrators highlighted the reliance on data as a foundational element in developing strategies to enhance student engagement. The emphasis on data-driven decision-making reflects a broader institutional commitment to improving teaching quality and student outcomes. School Administrator 2 confirmed this in his interview,

“Teachers undoubtedly rely on data, particularly concerning student attendance. This information serves as a starting point for identifying strategies or interventions to foster student engagement. It holds significant importance, as it guides our efforts towards improving or enhancing student involvement.” (School Administrator 2)

It is evident that school administrators play a crucial role in empowering teachers to develop the skills and confidence necessary for effectively gathering, assessing, and applying data insights to their instructional practices. By providing essential resources, training, and infrastructure, administrators can create a supportive environment where data-driven decision-making thrives. This is particularly important for developing teachers' DLA, as effective information gathering enables educators to adapt their teaching methods to meet

the diverse needs of their students [59].

Table 4 provides a concise summary of the findings explored in this study.

TABLE IV
FINDINGS SUMMARY

Main Theme	Sub-theme(s)	Findings
The Role of Information Gathering on Teachers' Digital Learning Agility	Information Gathering for Effective Digital Learning	Teachers engage in continuous learning to enhance digital competencies. They utilise webinars, online resources, and diverse platforms (e.g., TikTok) for professional development. Collaboration with administrators and parents supports ongoing teacher development and professional growth.
	Enhancing Teaching Through Data Utilisation	Strategic use of data guides teaching methods and improves student engagement. Data aids in planning instructional steps, tracking student engagement, and acknowledging student efforts.

V. CONCLUSION

In conclusion, the role of gathering information for teachers' DLA development lies in its ability to empower educators to adapt, innovate, and deliver high-quality instruction in the ever-evolving digital landscape. By engaging in continuous learning, exploring diverse information sources, and seeking external support and guidance, teachers can cultivate the necessary skills and mindset to navigate the challenges of modern-day teaching effectively [62]. Furthermore, the strategic utilisation of data-informed teaching practices enables educators to make informed decisions, tailored to the unique needs of their students, fostering a supportive and engaging learning environment.

The educational community, including administrators and parents, plays a crucial role in recognising the significance of this potential and providing the necessary resources, training, and infrastructure to support teachers in their DLA development. By embracing these practices, the education sector can ensure that teachers are equipped to meet the demands of the 21st century, ultimately enhancing the quality of education and leading to improved student outcomes. Moreover, to fully realise the potential of DLA, teacher training programs should integrate AI-powered learning tools and big data analytics. These tools not only enhance information gathering but also foster reflective practices and decision making aligned with modern educational challenges. Overall, this study contributed a vital foundation for understanding the importance of information gathering among teachers and it serves as a springboard for further investigations into the nuances of teachers' DLA development, paving the way for the continuous evolution and improvement of educational practices.

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Kamilah Abdullah is a Ph.D. student at UPM, and currently a recipient of the Program Hadiah Latihan Persekutuan (HLP) scholarship. Outside academia, she serves as an English teacher and her ongoing research centres on elevating teacher professional development within the domain of education technology for the betterment of educators and learners. She can be reached via

email: gs61357@student.upm.edu.my.



Noor Syamilah Zakaria obtained her Ph.D. in Counselor Education and Supervision from University of Wyoming, USA. She is an Associate Professor at the Department of Counselor Education and Counseling Psychology, Faculty of Educational Studies, Universiti Putra Malaysia. Her current focus of interest is foregrounded on counselor education and

supervision, with her research enthusiasm in counseling ethics education as well as teacher education and professionalism. She is also passionate about curriculum design and development, educational technology and students' holistic development. She can be reached via email: syamilah@upm.edu.my



Mas Nida Md. Khambari has a Ph.D. in Curriculum and Instruction (Educational Communications & Technology) from University of Wisconsin-Madison. She is presently an Associate Professor at Faculty of Educational Studies in Universiti Putra Malaysia. Her current research interest includes Information Technology, Educational Technology,

Teachers Professional Development, Laptops in Education, Interactive Whiteboards in Education and Cultural Historical Activity Theory (CHAT). She can be reached via email: khamasnida@upm.edu.my



Nur Dania Mohd Rosli is a MSc. Student of Faculty of Educational Studies, Universiti Putra Malaysia. The primary area of investigation in her research pertains to the digital learning agility and competency of educators as they transition to an online and blended learning environment. The objective of her ongoing endeavour was to establish a

framework that would promote digital learning agility among educators in Malaysia, with the ultimate goal of guaranteeing a sustainable and high-quality education for forthcoming generations. She can be contacted at email: daniariozie@gmail.com



Su Luan Wong earned her PhD in educational technology from Universiti Putra Malaysia (UPM) in 2003 and currently holds the position of Professor at the Faculty of Educational Studies, UPM. She serves as an Executive Committee Member for the Asia-Pacific Society for Computers in Education (APSCE). Notably, in 2011, she founded the Special Interest Group — Development of Information and Communication Technology in

the Asia-Pacific Neighborhood, aimed at bridging the research divide between scholars in developing and developed countries. Her commitment and diligent efforts in contributing to the Asia-Pacific research community were recognized when she assumed the prestigious role of President of APSCE from 2016 to 2017. Su Luan Wong's leadership has significantly impacted the organization, reflecting her dedication to advancing education and technology research in the region. She can be reached via email: suluan@upm.edu.my



Priscilla Moses is an Associate Professor and Head of Programme (PhD in Education) at the Faculty of Creative Industries, Universiti Tunku Abdul Rahman. She holds a doctorate in Educational Technology from the Universiti Putra Malaysia. Her research interests is in educational technology, technology acceptance, e-learning, blended learning, and STEM education. She has

published 14 research papers in both international and national journals, exemplifying her dedication to scholarly contributions. Among these publications, 3 papers have been recognized in SSCI journals, with 2 featured in the prestigious Q1 category and 1 in Q2. Notable SSCI journals that have published her work include The Asia-Pacific Education Researcher, Educational Technology

Research and Development, and Interactive Learning Environments. She can be reached via email: priscilla@utar.edu.my



Nur Aira Abdrahim is a Senior Lecturer at Department of Professional Development and Continuing Education, Faculty of Educational Studies of Universiti Putra Malaysia. Her field of specialization is in adult education and adult learning, with special interest in learning using technology and ICT. She has a Doctorate of Education in Adult and Community

Education (Ed.D) from North Carolina State University, United States of America. Her contact email is at nuraira@upm.edu.my



Najwan Khambari holds a PhD in Computing from the University of Plymouth and is currently a senior lecturer at the Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka (UTeM). He has a rich background in both academic and industry settings, having worked at a telecommunications provider company and as a Graduate Research Assistant before

transitioning to a full-time academic role. He has contributed to the development of programs for various academic institutions as a subject matter expert. His expertise includes computer networking and security, wireless and mobile networking, QoS and the Internet of Things (IoT). He is actively involved in the Information Security Forensics and Computer Networking (INSFORNET) research group and is passionate about guiding students in developing innovative solutions, particularly in the field of IoT. He can be contacted at email: najwan@utem.edu.my.