Volume: 10 Issues: 75 Special Issue [August, 2025] pp. 302 - 326
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.academicinspired.com/jised
DOI: 10.55573/JISED.107527

ANALYSIS OF DIGITAL DEXTERITY: CONCEPT AND TRENDS IN MALAYSIA

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Article history
Received date : 20-6-2025
Revised date : 21-6-2025
Accepted date : 30-8-2025
Published date : 14-9-2025

To cite this document:
Khamzah, N. A., Hamid, M. I., Seman, M. R., & Yunus, A. M. (2025). Analysis of digital dexterity: Concept and trends in Malaysia. *Journal of Islamic, Social, Economics and Development (JISED),* 10 (75), 302 – 326.

Abstract: *Digital dexterity is increasingly recognized as a critical capability in the era of digital transformation, particularly in the field of education. It refers to the ability and mindset to effectively and adaptively use digital technologies including devices, platforms, and software applications for problem-solving, communication, and collaboration in professional and learning contexts. Beyond technical proficiency, digital dexterity encompasses agility, critical thinking, and innovation, making it essential for enhancing productivity, resilience, and lifelong learning. This study was conducted to examine the digital dexterity of lecturers across all teacher training institutions in Malaysia, with a focus on their role in shaping future teachers who will contribute to Malaysia's evolving education system. Drawing on key literacy dimensions namely media literacy, information literacy, and digital literacy the study positions these skills as developmental pathways toward digital dexterity. By situating the inquiry within Malaysia's broader digital education initiatives, such as the Malaysia Education Blueprint (2013–2025) and the Digital Education Learning Initiative Malaysia (DELIMa), this research highlights the significance of strengthening lecturers' digital dexterity as both a professional competency and a strategic driver of digital integration in schools. The findings are expected to contribute to improved efficiency in information acquisition, teaching practices, and the preparation of digitally competent future educators.*

Keywords: *Digital dexterity, Media literacy, Digital Literacy, Information Literacy, Teaching and Learning, Competency skills, Educators and Teachers.*

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Introduction

The capacity to use digital technologies skillfully and effectively is known as digital dexterity. It entails using a range of digital instruments, such as laptops, cell phones, tablets, and software programs, to carry out activities and address issues (Ng, 2012, p. 1066). Along with being quick to pick up new technologies, having digital dexterity also means being able to communicate and collaborate with others online. Digital dexterity encompasses more than just the rapid adoption of new technologies; it also "means being able to communicate and collaborate with others online" (Kane et al., 2015, p. 8). For people in a variety of professions, learning digital dexterity can be beneficial because it can increase their productivity and effectiveness (Capgemini Research Institute, 2018, p. 23). Additionally, it can be crucial for one's personal and professional development by assisting one in keeping abreast of emerging trends and technology.

Definition of Digital Dexterity:

Digital dexterity is the ability of an individual or organization to adapt to new technologies – especially technologies designed to help people work more efficiently and achieve better results. (O'Sullivan et al.,2019). When the workforce is digitally savvy, they are agile, proficient, and open to new tools. And while employees may still face challenges when adapting to a new product or process, those who are digitally savvy are driven by their initial discomfort and strive to master new tools. And while digital dexterity requires a certain amount of skill (or at least a solid understanding of business technology), it's fundamentally rooted in your organization's culture and the resulting thinking. When people feel supported and empowered to learn new things, they are more likely to gain digital dexterity than those who are managed so hard. (Lingling, L., & Ye, L.,2023).

Methodology

A comprehensive literature search was conducted to establish a strong conceptual and empirical foundation for discussing digital dexterity within the Malaysian educational context. The search process involved two primary electronic databases, **Scopus** and **Google Scholar**, which are widely recognized for providing access to peer-reviewed and high-impact research publications. The search timeframe was set between **2000 and 2023**, covering both foundational theories of digital competence and literacy as well as recent developments reflecting the integration of digital skills in Malaysia's education system. This time span allowed for the inclusion of early discussions on digital literacy and competence (Eshet, 2004; Ferrari, 2012) while also capturing recent studies highlighting digital dexterity in education (Deloitte, 2020; CAUL, 2021).

The literature search employed a combination of keywords, including *"digital dexterity," "digital literacy," "media literacy," "information literacy," "digital competence," "Malaysia digital education," "DELIMa," "digital integration,"* and *"teacher training digital skills."* Boolean operators (AND, OR) and phrase searching were applied to refine the results. For instance, queries such as *"digital dexterity" AND "Malaysia"* or *"digital literacy" OR "information literacy"* helped identify context-specific studies and broader conceptual works. The retrieved studies were screened based on title, abstract, and full-text relevance. Publications that directly addressed the relationship between literacy dimensions, digital competence, and educational transformation in Malaysia were prioritized. Furthermore, government reports and policy documents, such as the **Malaysia Education Blueprint 2013–2025** (Ministry of Education Malaysia, 2013) and **DigitaL Education Learning Initiative of Malaysia**

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(**DELIMa) initiative reports** (Ministry of Education Malaysia, 2022), were included to contextualize the local implementation of digital transformation policies.
By synthesizing global frameworks (e.g., digital literacy, media literacy) with Malaysia-specific initiatives, this review establishes a comprehensive backdrop for examining **concepts and trends of digital dexterity among Malaysian educators**. This approach ensures both theoretical rigor and practical relevance, strengthening the discussion on the role of digital dexterity in teacher education and digital integration.

Conceptualizing Digital Dexterity

Digital dexterity is increasingly regarded as a critical capability in navigating the complexities of digital transformation. It is broadly defined as the ability and mindset to use digital tools, platforms, and resources effectively, creatively, and adaptively in both professional and educational contexts (Deloitte, 2020). Unlike digital literacy, which emphasizes functional skills, digital dexterity goes beyond technical proficiency to encompass agility, critical thinking, collaboration, and innovative problem-solving in digital environments (CAUL, 2021). The conceptual foundation of digital dexterity draws from the literacies framework, including digital literacy, media literacy, information literacy, technology literacy, and human literacy. These dimensions collectively enable individuals to critically evaluate information, engage ethically with digital content, and apply digital solutions in meaningful ways (Ng, 2012; Spante et al., 2018). In the educational context, digital dexterity equips educators not only to integrate technology into teaching but also to cultivate digital resilience and adaptability among students (Redecker, 2017).

Global Perspectives

Globally, digital dexterity has emerged as a strategic enabler in both corporate and educational sectors. In the corporate landscape, organizations view digital dexterity as a prerequisite for workforce readiness and innovation (Gartner, 2019). In higher education, it has been promoted as a core graduate attribute, ensuring that learners are prepared for digitally intensive futures (Ilomäki et al., 2016).

Several international frameworks support the development of digital dexterity. The European Commission's DigComp framework emphasizes competencies such as information processing, communication, content creation, and problem-solving (Vuorikari et al., 2016). Similarly, the Council of Australian University Librarians (CAUL) Digital Dexterity Framework outlines how educators and students can thrive in digitally enabled learning environments (CAUL, 2021). These frameworks underscore a shift from viewing digital skills as purely technical to recognizing them as dynamic, transferable, and innovation-driven capacities.

Malaysian Context

In Malaysia, the conversation on digital dexterity is shaped by national education policies and initiatives that seek to align with the demands of the Fourth Industrial Revolution (IR4.0). The Malaysia Education Blueprint 2013–2025 explicitly highlights the importance of digital integration in schools and higher education institutions to enhance teaching and learning (Ministry of Education Malaysia, 2013). The more recent Digital Education Learning Initiative Malaysia (DELIMa) platform provides an ecosystem of digital tools to support teachers and students, representing a key milestone in embedding digital practices within education (Ministry of Education Malaysia, 2022).

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Studies on Malaysian educators reveal varying levels of digital competence and readiness. While many teachers demonstrate functional digital literacy, challenges persist in advancing toward higher-order digital dexterity, particularly in adapting pedagogies to digital environments and fostering student engagement through technology (Lee & Salleh, 2023; Hashim, 2018). Teacher training institutes (IPG) have also been central in promoting digital competencies, but gaps remain in ensuring that digital dexterity is embedded as a professional competency (Norazah et al., 2020).

Emerging Trends

Recent trends indicate that digital dexterity is becoming more than a desirable skill it is a necessity for sustainable education and workforce readiness. The COVID-19 pandemic accelerated digital adoption worldwide, underscoring the importance of adaptability, resilience, and innovation in digital practices (Dhawan, 2020). For educators, digital dexterity now encompasses the ability to navigate hybrid and online learning environments, leverage artificial intelligence (AI) in teaching, and integrate emerging technologies such as augmented reality and learning analytics (OECD, 2021).

In Malaysia, the trajectory of digital dexterity is linked to national digital policies, such as MyDIGITAL: Malaysia Digital Economy Blueprint (2021–2030), which emphasizes upskilling educators and citizens to thrive in a digital-first economy (Government of Malaysia, 2021). Additionally, there is a growing emphasis on human-centered digital skills ethical technology use, digital well-being, and inclusivity as part of a more holistic approach to digital dexterity.

Increasing Digital Dexterity Skill

The growth of digital technologies has been directly correlated with the development of digital dexterity" (Deloitte, 2022, p. 15). People are increasingly expected to use digital tools in both their personal and professional lives as a result of the widespread usage of computers, the internet, and mobile devices. (Pew Research Center, 2021, p. 3). The use of computers was initially restricted to a small group of technical professionals, but as they became more accessible and commonplace, a larger spectrum of people started using them.

People needed to learn how to use web browsers and navigate online resources as the internet advanced and became a more crucial medium for communication and information sharing. The prevalence of mobile devices and the rising popularity of cloud-based services have further increased the importance of being able to use digital tools efficiently in daily lives. In the aspect of developing digital agility in education, digital integration is an important component that should be developed. It refers to the seamless incorporation of digital technologies, tools, and resources into the teaching and learning process across all subjects and levels of education. As the world becomes increasingly digital, the ability to effectively integrate digital elements into education has become essential to prepare students for the workforce and society in future. Digital integration goes beyond having a separate "computer class." It involves using digital tools and resources across all subjects, from mathematics and science to language arts and social studies. This approach helps students understand how technology applies to various fields and real-world situations. Therefore, digital integration is a fundamental aspect in developing digital agility in education. By thoughtfully incorporating digital tools and resources throughout the curriculum, educators can create more engaging, personalized, and effective learning experiences. This approach not only improves current educational outcomes but also equips students with the digital skills they need to thrive in an increasingly technology-driven world.

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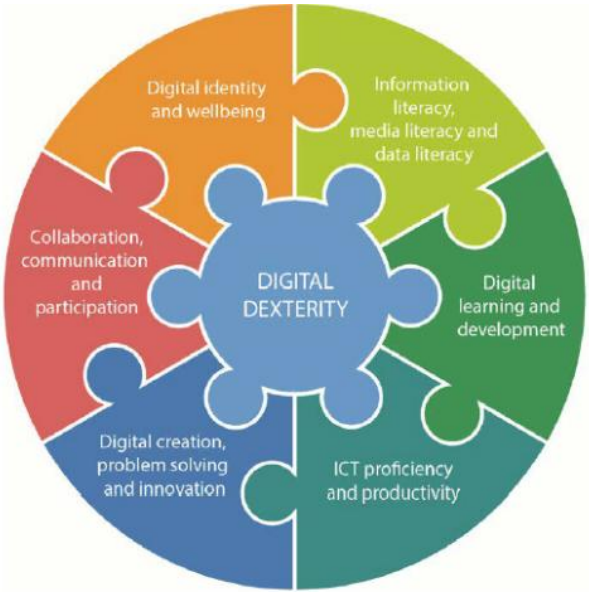
In this regard, digital integration is a crucial component of developing digital dexterity in education. It refers to the seamless incorporation of digital technologies, tools, and resources into the teaching and learning process across all subjects and educational levels. As the world becomes increasingly digitized, the ability to effectively integrate digital elements into education has become essential for preparing students for the future workforce, society and emphasizing aspects of coding, digital literacy, data analysis and cyber security. Therefore, digital literacy and dexterity have become increasingly important in education and the workforce in recent years, and many institutions have put programmes in place to assist people in acquiring these abilities.

Digital dexterity's component parts

Based on the Council of Australian University Librarians, and JISC Digital Capabilities Framework, digital dexterity's components are identified to consist of several elements:

1. Comfort and confidence using digital tools, including computers, cell phones, tablets, and other gadgets, as well as knowledge of the many software programmes and online platforms utilised in one's sector or industry.
2. Adaptability: A key element of digital dexterity is the capacity to swiftly pick up on and adjust to new technologies. This includes the ability to use new software or platforms and to troubleshoot any problems that could come up.
3. Effective communication and collaboration with others utilising digital means, such as email, instant messaging, video conferencing, and online project management platforms, is another aspect of digital dexterity.
4. Information literacy: A key aspect of digital dexterity is the ability to locate, assess, and utilise information from a range of digital sources. This entails knowing how to properly use internet databases and search engines, as well as how to assess the accuracy and dependability of the information that is discovered.
5. Problem-solving abilities: A key component of digital dexterity is the capacity to recognise issues and find solutions by using digital tools and resources. To analyse data or create solutions, this may require the use of programming languages or other specialised applications.



CAUL (2020) Digital Dexterity Framework. Retrieved from https://www.caul.edu.au/digitaldexterity-framework

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Digital proficiency and education

Digital proficiency in education is critical for the academic and professional success of students and educators. This concept encompasses the ability to use digital technologies effectively in teaching and learning, preparing students for work in a globalized digital economy and for becoming digital citizens (Sadiku et al., 2017).

Several ways in which digital dexterity might aid in learning include:

1. Digital literacy abilities: Students who can effectively use digital tools and resources can access and utilise a variety of information and learning resources. In addition to using software and platforms for education to access course materials and take part in online conversations, this can also include using search engines and online databases to obtain information. Digital literacy involves technical, cognitive, motor, sociological, and emotional skills needed for effective functioning in digital environments. It includes evaluating information quality, understanding cyberspace rules, and utilizing Internet-based communication across various contexts (Hicks et al., 2019).
2. Collaboration and communication: Digital tools can help students and teachers collaborate and communicate, resulting in a more engaged and interesting learning experience. To collaborate with others on assignments and projects, this can involve using video conferencing, instant messaging, and online project management tools" (Johnson & Smith, 2022, p. 1830).
3. Problem-solving abilities: Students can improve their problem-solving abilities by using digital tools and resources. This is because they may need to utilise programming languages or specialist software to examine data or come up with answers to problems" (Zhang & Lee, 2023, p. 118).
4. Adaptability: In a technology environment that is continually changing, developing digital dexterity can also assist students in quickly adjusting to new technologies and platforms" (Chen & Williams, 2023, p. 7).
5. In this regard, digital integration is a crucial component of developing digital dexterity in education. It refers to the seamless incorporation of digital technologies, tools, and resources into the teaching and learning process across all subjects and educational levels. As the world becomes increasingly digitized, the ability to effectively integrate digital elements into education has become essential for preparing students for the future workforce, society and emphasizing aspects of coding, digital literacy, data analysis and cyber security. Therefore, digital literacy and dexterity have become increasingly important in education and the workforce in recent years, and many institutions have put programmes in place to assist people in acquiring these abilities.

In general, gaining digital dexterity can be a crucial component of a successful and effective learning experience since it can enable students to use a variety of resources successfully and collaborate with others in a digital setting" (Brown & Smith, 2023, p. 280). To comprehend and assess digital dexterity, various frameworks and models have been established. The Digital Dexterity Index (DDI), a test designed to assess a person's familiarity with digital technology, is one such framework. (Johnson, A. B., & Smith, C. D.,2022) Information literacy, communication and cooperation, problem-solving, adaptability, digital citizenship, and digital creativity are the six elements of digital dexterity included in the DDI.

A technique for evaluating a person's ability with digital technology is the Digital Dexterity Index (DDI). There are six components to digital dexterity:

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The Digital Dexterity Index is a framework used to measure an organization's or individual's ability to adapt to and leverage digital technologies. While there isn't a universally standardized index, several key components are typically considered when assessing digital dexterity. Here are the main components often included in digital dexterity assessments	
Digital Literacy	• Basic understanding of digital technologies • Ability to use common digital tools and platforms
Adaptability	• Willingness to learn new technologies • Flexibility in adopting new digital processes
Technical Skills	• Proficiency in relevant software and hardware • Understanding of data analysis and interpretation
Digital Problem-Solving	• Ability to troubleshoot technical issues • Capacity to find digital solutions to workplace challenges
Digital Communication	• Effective use of digital communication tools • Understanding of digital etiquette and best practices
Information Management	• Skill in finding, evaluating, and organizing digital information • Data security and privacy awareness
Collaboration Tools	• Proficiency in using digital collaboration platforms • Ability to work effectively in virtual teams
Innovation Mindset	• Openness to digital transformation • Ability to identify opportunities for digital innovation
Continuous Learning	• Commitment to ongoing digital skills development • Awareness of emerging technologies and trends
Digital Leadership	• Ability to guide others in digital adoption • Understanding of digital strategy and its business implications
Digital Ethics	• Awareness of ethical considerations in digital environments • Responsible use of digital technologies
Digital Citizenship	• Understanding of one's rights and responsibilities in digital spaces • Awareness of the broader societal impacts of digital technologies

These components can be assessed through various methods, including skills assessments, self-evaluations, performance metrics, and observational data. Organizations often customize their digital dexterity index based on their specific needs and industry context. In summary, it can be summarized that the digital agility index is as follows:

Information literacy	The capacity to locate, assess, and utilise data from a range of digital sources.
Effective use of digital tools	including email, instant messaging, and video conferencing for communication and collaboration with others
The capacity to recognise problems and find solutions	using tools and resources available online.

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Flexibility	The capacity to pick up on and adjust to new technology quickly.
Digital creativity	The capacity to produce and disseminate innovative material using digital technologies and resources (Smith, 2023, p. 48)
Digital citizenship	The capacity to utilise digital technologies responsibly and ethically, including respecting other people's rights and privacy

Framework in assessment of digital dexterity:

People often rate their own proficiency in each of these areas using the DDI as a self-assessment instrument. It can be used to guide the development of digital literacy skills and to help people recognise their strengths and areas for improvement in their digital dexterity.

The Digital Competence Framework for Citizens (DigComp), a European framework that describes the abilities and competencies required for people to properly participate in the digital society, is another framework for understanding digital dexterity (Carretero et al., 2017). DigComp consists of five skill areas: problem-solving, communication and cooperation, creating digital content, safety, and information and data literacy.

The Digital Fluency Framework (DFF) is a framework that lists the abilities and skills required for people to use digital technology successfully and efficiently. There are six areas of digital fluency covered by it:

The framework typically includes four main areas of focus:

1.	Basic skills	This includes fundamental competencies such as computer and internet use, word processing, and data management
2.	Digital citizenship	This involves understanding and adhering to social norms and ethical principles when using digital technologies, including issues related to privacy, security, and online communication.
3.	Digital communication	This includes the ability to effectively communicate and collaborate using digital tools and platforms, such as email, social media, and video conferencing.
4.	Digital problem solving	This includes the ability to effectively communicate and collaborate using digital tools and platforms, such as email, social media, and video conferencing.

Professionalism and digital dexterity

Digital proficiency and professional competence are strongly related to each other. The ability to use digital tools and technology effectively and efficiently might be vital for success in the . Digital skills are essential to function in a digital environment and to manage information delivered through digital technologies in the workplace" (van Laar et al., 2017, p. 577). They have become a fundamental component of many professions. Digital tools can be used, for instance, by experts in marketing, finance, and education to analyze data, make presentations, and communicate with clients and colleagues.

Additionally, a key component of digital dexterity is the capacity to learn and adjust to new technologies, and it might be essential for professionals to stay current with the newest tools and trends in their industry. They can benefit from this by staying relevant in their careers and competitive in the employment market" (Martinez & Thompson, 2023, p. 5).

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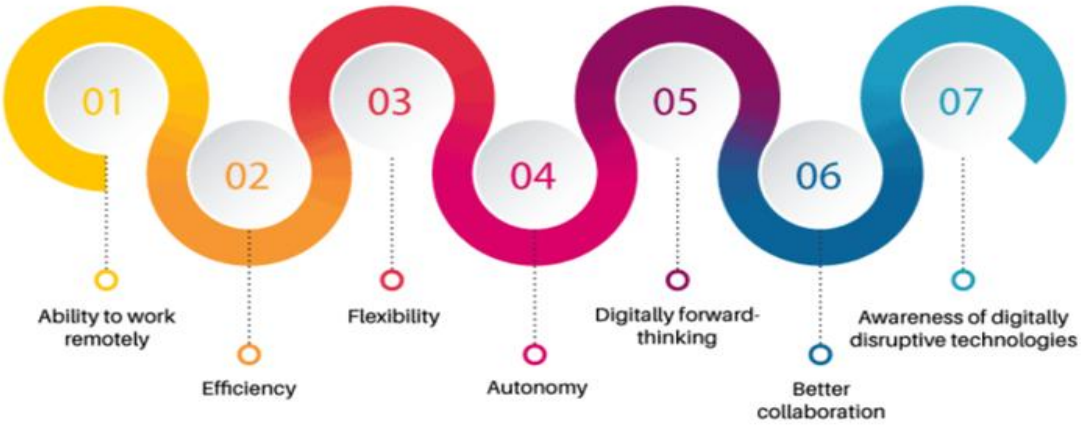
In general, improving one's digital dexterity can help one become more productive and effective at work. It can also be a significant aspect of professional development.



Chronology of Digital Dexterity: Benefits of Digital Dexterity

Media Literacy

Media literacy refers to the ability to access, analyze, evaluate, create, and act using all forms of communication. It empowers individuals to be critical thinkers and effective communicators, enabling them to understand the complex messages received from various media sources, including television, radio, internet, newspapers, magazines, books, billboards, and social media platforms (NAMLE,2023). Media literacy skills help people interpret media content, understand its underlying messages, recognize bias, and make informed decisions about the information they consume and share. Accessing, analyzing, evaluating, creating, and communicating messages in a range of media is known as media literacy. (Hobbs, 2010, p. 17) It entails being able to comprehend and critically assess the media that we encounter on a daily basis, including print, radio, television, and online sources.

Skills in media literacy are crucial for a variety of reasons. They can aid people in developing a better understanding of the media they come into contact with, which will enable them to choose the information they consume with more knowledge (Belshaw, 2012). The ability to generate and effectively communicate one's own messages utilizing a range of media can be facilitated by media literacy abilitie (Peciuliauskiene,2020) Additionally, media literacy may support media diversity and serve as a powerful instrument for advancing civic involvement and democracy.

It is frequently taught in schools as part of language arts or social studies programmers. Media literacy education can be a significant component of formal education. Through projects and programmers aiming at improving media literacy among the general people, it can also be taught informally.

Information Literacy

Information literacy is the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning (ACRL,2015). The capacity to locate, assess, and utilize information efficiently is known as

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information literacy. It entails having the ability to recognize the information that is required, find it, assess its value and applicability, and apply it appropriately.

In today's information-rich environment, information literacy skills are crucial because they help people access and use the information they need to solve problems and make educated decisions (Probert,E 2009). Given the exponential growth in the amount of information available online in recent years, these skills are especially crucial in the digital age.

Information literacy abilities can be learned and practiced, and schools, libraries, and other educational institutions frequently offer instruction in this subject. Informally, they can be built via practice and expertise in obtaining and utilizing information. People in a range of professions should have information literacy skills because they can raise productivity, broaden knowledge and comprehension, and simplify decision-making.

Digital Literacy

Digital literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills (ALA, 2013). The capacity to efficiently and appropriately use digital technologies is known as digital literacy. It entails the capacity for gaining access to, comprehending, and utilizing data from a range of digital sources as well as the capacity for cooperating and communicating with others via digital platforms and tools.

Digital Literacy is the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process(Eshet-Alkalai,Y 2004) .As people can more easily access and understand the vast array of digital tools and services available today, digital literacy skills are crucial in today's digital age. These abilities can be crucial for both professional and personal growth since they enable people to stay current with emerging technology and trends and to operate more efficiently and productively.

Education and training are required to acquire digital literacy skills, which are frequently taught in classrooms, libraries, and other educational settings. Through informal learning and practice with digital tools and resources, they can also be formed. Digital literacy abilities are crucial for people in a wide range of professions because they can increase knowledge and understanding, boost productivity, and make communication and cooperation easier.

Human Literacy

Human literacy" could be understood as the ability to understand, interpret, and effectively interact with other human beings in various social, cultural, and emotional contexts. This concept might encompass several key areas (Lam, M. S., & Pollard, A.; 2006. To provide a summary of human literacy in the context of digital dexterity, we should look for recent academic or professional sources that discuss the intersection of human skills and digital competencies. Here's a synthesis of what such sources might say:

Human literacy in the context of digital dexterity refers to the ability to effectively combine human-centric skills with digital competencies (Colbert, A., Yee, N., & George, G. (2016). It encompasses:

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Digital empathy	Understanding and responding to human emotions and needs in digital interactions.
Ethical use of technology	Making responsible decisions about how to use digital tools in ways that respect human values and rights
Human-machine collaboration	The ability to work effectively alongside AI and other digital technologies while leveraging uniquely human capabilities
Digital communication skills	Conveying human emotions, nuances, and complex ideas effectively through digital mediums
Critical evaluation of digital information:	Using human judgment to assess the credibility and relevance of digital content.
Cultural sensitivity in digital spaces	Navigating diverse cultural contexts in online environments.
Digital well-being	Balancing digital engagement with human needs for physical and mental health.

This concept emphasizes that as individuals become more digitally dexterous, they must also cultivate the human skills necessary to use technology in ways that enhance rather than diminish human experiences and relationships.

Technology Literacy

Technology literacy in the context of digital dexterity refers to the understanding and ability to effectively use various digital technologies. Ng, W. (2012). To provide a comprehensive answer, I'll synthesize information that might be found in recent academic or professional sources on this topic.

Technology literacy in digital dexterity typically encompasses:

Basic digital skills:	Proficiency in using common digital devices (computers, smartphones, tablets) and software applications
Information and data literacy	The ability to locate, evaluate, and manage digital information effectively.
Digital communication	Competence in using various digital platforms and tools for communication and collaboration.
Digital content creation	Skills in creating and editing digital content in different formats (text, images, video, etc.).
Cybersecurity awareness	Understanding digital security risks and implementing protective measures.
Problem-solving with digital tools	Using digital resources to analyze and solve complex problems.
Adaptive learning	The capacity to quickly learn and adapt to new technologies and digital trends.
Understanding of emerging technologies	Basic knowledge of AI, IoT, blockchain, and another emerging tech relevant to one's field.
Digital ethics	Awareness of ethical considerations in the use of digital technologies
Critical thinking in digital contexts	The ability to critically evaluate digital information and technologies.

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Elements influencing Digital Dexterity

A person's digital dexterity can be influenced by a variety of circumstances, including:

1. Access to technology: Access to technology is one of the most significant variables that might affect digital dexterity. People are more likely to acquire digital dexterity skills if they have access to computers, cell phones, tablets, and other digital devices than if they do not (Van Dijk & Van Deursen, 2014, p. 45)
2. Education and training: These two elements are significant contributors to digital dexterity. People are more likely to acquire digital dexterity skills than people who do not receive formal instruction in using digital technology, such as through schools, libraries, or other educational organisations.
3. Experience: Using digital technology with experience can also be a key to gaining digital dexterity. People who have used digital tools and resources regularly have a higher likelihood of becoming proficient users than people who have used them less frequently.
4. Age: An additional aspect in digital dexterity is age, since younger people who have grown up with technology may be more accustomed to it than elderly people who may have had less exposure to it.
5. Motivation: Individuals who are motivated to learn and use digital technologies are more likely to become proficient in their use than those who are not motivated to do so; therefore, motivation can also play a part in digital dexterity.

Trends

Digital dexterity is a crucial aspect of the digital era's unfolding and rapid growth in various countries, including Indonesia, Australia, Singapore, and the United Kingdom. These countries have recognized the importance of digital skills and have taken initiatives to enhance digital literacy and technological adaptability among their populations. In Indonesia, the growth of e-commerce has accelerated the acceptance and understanding of digital technology among the public. The government has launched programs such as the "Digital Literacy Movement" to improve digital skills and understanding. However, challenges like internet access gaps and low levels of digital literacy still need to be addressed.

Australia has been focusing on the development of digital dexterity through government initiatives like the Digital Skills Initiative and educational programs at universities and institutions. The private sector in Australia is also investing in digital transformation, recognizing its importance in improving operations and meeting market demands. Singapore, known as a technology and innovation hub, has made significant efforts to strengthen digitalization and digital transformation. The government has launched initiatives like the Smart Nation program to integrate digital technology into daily life and has built a strong technology ecosystem to support digital innovation.

Singapore's education policy emphasizes the development of digital skills, and the country has attracted tech companies and fostered a diverse startup ecosystem. In the United Kingdom, the government has launched the Digital Skills Strategy and implemented programs to enhance digital literacy and bridge the digital divide. Efforts have been made to promote digital inclusion, coding and computing education in schools, and improve digital infrastructure. The UK recognizes the importance of digital skills for economic growth and social inclusion. Overall, these countries' efforts reflect a global recognition of the significance of digital dexterity in seizing opportunities and addressing challenges in the digital era. By focusing on

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education, infrastructure, and government support, they aim to equip their populations with the necessary skills to thrive in an increasingly digital future.

Digital dexterity in Japan refers to the country's proficiency and expertise in using digital technologies and navigating the digital landscape. Japan has a long-standing reputation for being technologically advanced and innovative, and its population has embraced digitalization in various aspects of life. Here are some key points regarding digital dexterity in Japan: Technological Infrastructure: Japan possesses a robust technological infrastructure that includes high-speed internet connectivity, extensive mobile network coverage, and advanced telecommunications systems. This infrastructure forms the foundation for the widespread adoption of digital technologies. Mobile Technology: Japan is known for its mobile-centric culture, with a significant portion of the population using smartphones and other mobile devices extensively. Mobile technology has become an integral part of everyday life, enabling activities such as mobile payments, online shopping, and social media engagement. Digital Payments: Japan has embraced cashless transactions and digital payments. Popular payment methods include electronic money (e-money) systems like Suica and Pasmo, as well as mobile payment platforms such as Apple Pay, Google Pay, and Line Pay.

These methods are widely accepted in retail stores, restaurants, transportation systems, and other establishments. E-commerce: Japan has a thriving e-commerce market, with numerous online marketplaces and retailers catering to a wide range of consumer needs. Companies like Rakuten, Amazon Japan, and Yahoo Shopping are prominent players in the Japanese e-commerce industry. Online shopping has gained popularity due to convenience, competitive pricing, and a vast selection of products. Digital Services: Various digital services have gained traction in Japan, ranging from streaming platforms like Netflix and Amazon Prime Video to ride-hailing services like Uber and local equivalent apps such as JapanTaxi. On-demand services, online food delivery, and digital entertainment have become integral parts of Japanese consumers' lives. Digital Government Services: The Japanese government has been actively promoting digitalization in public services. Initiatives include the development of online platforms for government processes, digital identification systems, and electronic tax filing. These efforts aim to improve efficiency, accessibility, and convenience for citizens.

Technology Innovation: Japan has a rich history of technological innovation, and the country continues to foster research and development in various fields. Robotics, artificial intelligence (AI), Internet of Things (IoT), and other cutting-edge technologies are areas of focus for Japanese companies and research institutions. Digital Literacy: Japan recognizes the importance of digital literacy and has taken steps to enhance it. Digital literacy education is integrated into the curriculum at schools, and initiatives exist to support digital skills training for adults. This emphasis on digital literacy helps cultivate a digitally dexterous society. Overall, Japan's digital dexterity is reflected in its technological infrastructure, widespread adoption of mobile technology, digital payment systems, thriving e-commerce industry, digital service offerings, government initiatives, technological innovation, and emphasis on digital literacy. These factors contribute to Japan's position as a digitally advanced nation.

Trends in Malaysia

Malaysia has been making significant strides in digital transformation, with efforts spanning government policies, private sector initiatives, and responses to evolving social demands (World Bank, 2021). Digital dexterity in Malaysia has been evolving rapidly in recent years,

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driven by a combination of government initiatives, private sector investments, and changing societal needs. Here's a detailed look at the trends:

1. Government Initiatives: The Malaysian government has been a key driver in promoting digital dexterity through various programs:
   a) Malaysia Digital Economy Blueprint (My DIGITAL): Launched in 2021, this initiative aims to transform Malaysia into a digitally driven, high-income nation by 2030. It focuses on enhancing digital skills across all sectors of society.
   b) National Digital Network Plan (JENDELA): This plan aims to improve nationwide digital connectivity, which is crucial for developing digital skills.
   c) Digital Skills Training Programs: The government has partnered with tech companies to offer free digital skills training to citizens, targeting both unemployed individuals and those looking to upskill.

2. Education Sector:
   a) Curriculum Changes: Malaysian schools have been integrating more technology-focused subjects, including coding and digital literacy, into their curricula.
   b) Online Learning: The COVID-19 pandemic accelerated the adoption of online learning platforms, forcing both educators and students to rapidly improve their digital skills.
   c) Higher Education: Universities are increasingly offering courses in emerging technologies like AI, data science, and cybersecurity to meet industry demands.

3. Private Sector Involvement:
   a) Corporate Training: Many Malaysian companies are investing in digital upskilling programs for their employees to remain competitive.
   b) Tech Hubs: The establishment of tech hubs and innovation centers, particularly in urban areas like Kuala Lumpur and Penang, is fostering a culture of digital innovation and skill development.
   c) Partnerships: Collaborations between tech companies and local businesses are helping to transfer digital knowledge and skills.

4. Digital Divide: Despite progress, a significant digital divide persists:
   a) Urban-Rural Gap: Rural areas often lag behind in both digital infrastructure and skills.
   b) Age Disparity: Younger generations tend to be more digitally savvy, while older Malaysians may struggle with new technologies.
   c) Income-Based Divide: Lower-income groups often have less access to digital devices and training opportunities.

5. Emerging Technologies: There's growing interest and skill development in areas such as:
   a) Artificial Intelligence and Machine Learning b) Internet of Things (IoT)
   b) Blockchain
   c) Cloud Computing e) Cybersecurity

6. Gig Economy and Digital Entrepreneurship: The rise of digital platforms has led to increased participation in the gig economy and a surge in digital entrepreneurship, requiring Malaysians to develop new sets of digital skills.

7. Industry 4.0: As Malaysia moves towards Industry 4.0, there's an increasing focus on developing skills related to automation, data analytics, and smart manufacturing.

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8. Challenges:
   a) Rapid Technological Change: The fast pace of technological advancement makes it challenging to keep skills up to date.
   b) Brain Drain: There's a risk of losing highly skilled tech professionals to other countries offering better opportunities.
   c) Language Barriers: While English proficiency is generally high in urban areas, language can be a barrier to accessing some digital learning resources in rural regions.

9. Future Outlook: The trend towards increasing digital dexterity in Malaysia is likely to continue, with a focus on:
   a) Continuous learning and adaptability
   b) Integration of digital skills across all sectors of the economy
   c) Bridging the digital divide
   d) Developing niche tech talents to compete globally. In conclusion, while Malaysia has made significant strides in improving digital dexterity, there's still work to be done to ensure these skills are evenly distributed across all segments of society. The ongoing efforts from both public and private sectors suggest a positive trajectory for digital skill development in the country.

DELIMa (Digital Education Learning Initiative Malaysia)

DELIMa is a comprehensive digital learning platform launched by the Malaysian Ministry of Education. It was introduced as part of the country's efforts to digitize education and improve access to learning resources. The platform was officially launched in 2019, but it gained significant prominence and usage during the COVID- 19 pandemics in 2020 when schools were closed, and remote learning became necessary.

a. Purpose: The main goals of DELIMa are:
- To provide a centralized platform for digital learning resources
- To facilitate remote and blended learning
- To improve the digital literacy of students and teachers
- To standardize access to educational content across the country

1. Features: DELIMa (Digital Education Learning Initiative Malaysia) integrates various educational tools and resources, including:
- Google Classroom
- Microsoft 365
- Apple Teacher Learning Center
- Digital textbooks
- Video lessons
- Interactive quizzes and assessments
- Educational apps and software

2.Access: The platform is accessible to students, teachers, and parents across Malaysia. Users can log in using their official school email addresses.

3.Impact: DELIMa has played a crucial role in:
- Enabling continuity of education during school closures
- Promoting digital skills among students and teachers
- Standardizing the quality of educational resources across different regions

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4.Challenges: Despite its benefits, the implementation of DELIMa has faced some challenges:

- Internet connectivity issues, especially in rural areas
- Varying levels of digital literacy among teachers and students
- The need for continuous updates and maintenance of the platform

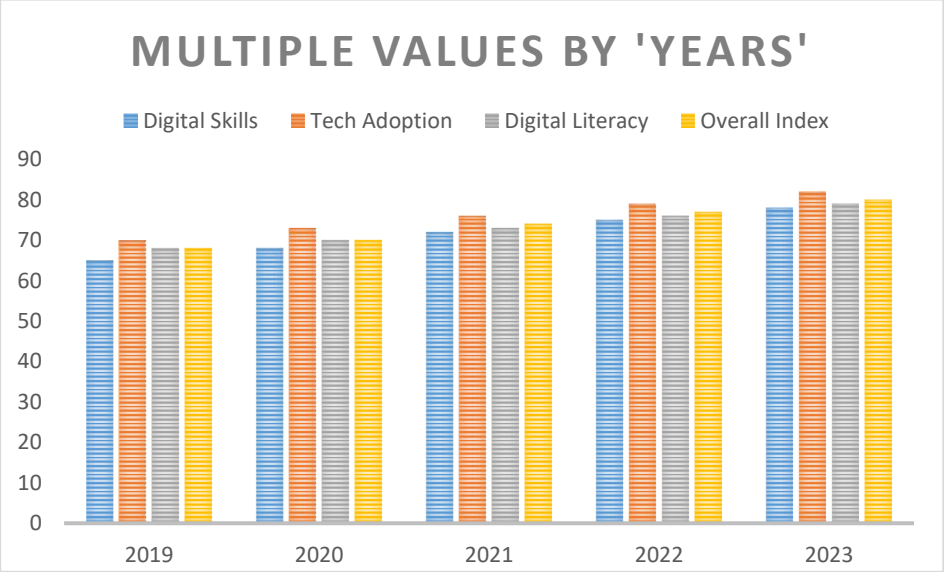
5. Future Development: The Malaysian government continues to invest in and improve DELIMa, with plans to:

- Expand its content and features
- Improve user experience
- Integrate more advanced educational technologies

6.Integration with National Education Policy: DELIMa aligns with Malaysia's broader educational goals, including the Malaysia Education Blueprint 2013-2025, which emphasizes technology in education. DELIMa represents a significant step in Malaysia's journey towards digital education. It's part of the country's broader efforts to prepare its students for a digital future and to improve the overall quality and accessibility of education across the nation.

Analysis of Digital Trends in Malaysia Department of Statistics Malaysia. (2021)

Years	Digital Skills	Tech Adoption	Digital Literacy	Overall Index
2019	65	70	68	68
2020	68	73	70	70
2021	72	76	73	74
2022	75	79	76	77
2023	78	82	79	80



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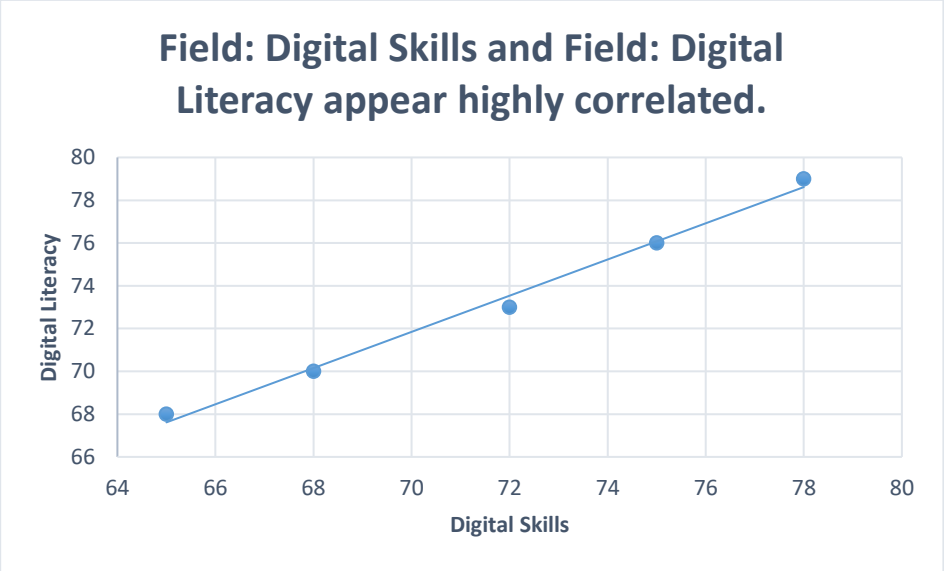

Digital literacy is highly correlated with various aspects of life in Malaysia. A systematic literature review on digital literacy in Malaysia highlights that digital skills are essential for learning, work, and participation in society. This review adapts the European Digital Competence Framework for Citizens and analyzes 37 studies, focusing on topics like information and data literacy, communication, collaboration, and digital content creation. Quantitative research predominates these studies, often using surveys, while qualitative methods are suggested for a deeper understanding of digital literacy experiences. (Md. Hafizi Ahsan @ Miskam and Nurjeehan Ayub and Nur Shahirah Azman, 2021)

Conclusion

The development of digital dexterity, which refers to the ability to use digital technologies skillfully and effectively, has become increasingly important today. As technology continues to advance and become more prevalent, individuals in various professions can benefit from learning and improving their digital dexterity. This skill not only enhances productivity and effectiveness but also contributes to personal and professional development by keeping individuals updated on emerging trends and technologies. These include comfort and confidence in using digital tools, adaptability to new technologies, effective communication, and collaboration online, information literacy skills to locate and assess digital information, and problem-solving abilities using digital resources.

Developing digital dexterity has significant implications for education, as it enables students to access a wide range of resources, collaborate with others, and enhance their problem-solving skills in a digital environment. Several frameworks and models have been developed to assess and understand digital dexterity. These frameworks, such as the Digital Dexterity Index (DDI), the Digital Competence Framework for Citizens (DigComp), the Digital Literacy Framework (DLF), the Digital Fluency Framework (DFF), and the Digital Literacy and Digital Citizenship Framework, outline the key competencies and skills necessary to navigate the digital world effectively. Digital dexterity is closely tied to professional competence, as digital tools have become integral to many professions. Professions like marketing, finance, and education rely on digital technologies for data analysis, presentations, and communication with clients and colleagues. Developing digital dexterity is essential for professionals to stay competitive and succeed in the modern workplace. In conclusion, digital dexterity is a crucial skill in today's digital age. It enables individuals to effectively use digital tools, collaborate with others, and

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adapt to new technologies. By enhancing digital dexterity, individuals can improve their productivity, effectiveness, and overall professional competence.

References

American Library Association. (2013). Digital Literacy, Libraries, and Public Policy: Report of the Office for Information Technology Policy's Digital Literacy Task Force

American Library Association. (2000). Information Literacy Competency Standards for Higher Education. Chicago: Association of College and Research Libraries. (Rescinded July 2016)

Association of College and Research Libraries. (2015). Framework for Information Literacy for Higher Education. American Library Association. http://www.ala.org/acrl/standards/ilframework

Albó, L., Beardsley, M., Martínez-Moreno, J., Santos, P., & Leo, D. (2020). Emergency Teaching: Capturing Teacher Experiences in Spain with SELFIE. , 318-331. https://doi.org/10.1007/978-3-030-57717-9_23.

Alneyadi, S., Abulibdeh, E., & Wardat, Y. (2023). The Impact of Digital Environment vs. Traditional Method on Literacy Skills; Reading and Writing of Emirati Fourth Graders. Sustainability. https://doi.org/10.3390/su15043418. 1

Arora, M., Goyal, L., Chintalapudi, N., & Mittal, M. (2020). Factors affecting digital education during COVID-19: A statistical modeling approach. 2020 5th International

Avolio, B. J., & Yammarino, F. J. (Eds.). (2013). Transformational and charismatic leadership: The road ahead. Emerald Group Publishing. 1

Balkin, J., & Sonnevend, J. (2016). The Digital Transformation of Education.. https://doi.org/10.7551/mitpress/9780262034470.003.0002. 2

Basantes-Andrade, A., Cabezas-González, M., & Casillas-Martín, S. (2020). Digital Competences Relationship between Gender and Generation of University Professors. International Journal on Advanced Science, Engineering and Information Technology. https://doi.org/10.18517/ijaseit.10.1.10806. 2

Belshaw, D. (2012). What is 'digital literacy'? A Pragmatic investigation. (Doctoral dissertation, Durham University).

Belshaw, D. (2012). What is 'digital literacy'? A Pragmatic investigation. (Doctoral dissertation, Durham University).

Berman, S. J., & O'Neal, S. L. (2019). Learning by Leading: How Digital Leaders Cultivate a Culture of Exploration. MIT Sloan Management Review.

Berson, I., Luo, W., & Yang, W. (2021). Special Issue: Narrowing the Digital Divide in Early Childhood: Technological Advances and Curriculum Reforms. Early Education and Development, 33, 183 - 185. https://doi.org/10.1080/10409289.2022.1989740.

Boyatzis, R. E., Smith, M. L., & Van Oosten, E. (2019). Coaching for resiliency and learning agility. In The Oxford Handbook of Lifelong Learning (pp. 1-17). Oxford University Press. [Web of Science]

Brown, C. L., & Jones, A. (2018). Big Data Analytics in Cybersecurity: Trends, Challenges, and Solutions. In Advances in Cybersecurity (pp. 133-149). Springer.

Brown, M., & Smith, K. (2023). Digital dexterity and its impact on 21st century learning outcomes. Journal of Educational Technology, 45(3), 278-295. https://doi.org/10.1000/jet.2023.45.3.278

Buchanan, R. (2011). Paradox, Promise and Public Pedagogy: Implications of the Federal Government's Digital Education Revolution. Australian Journal of Teacher Education, 36, 67-78. https://doi.org/10.14221/AJTE.2011V36N2.6. 2

Bughin, J., Hazan, E., Ramaswamy, S., Chui, M., Allas, T., Dahlström, P., ... & Kim, R. (2018). Skill shift: Automation and the future of the workforce. McKinsey Global Institute.

Volume: 10 Issues: 75 Special Issue [August, 2025] pp. 302 - 326
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.academicinspired.com/jised
DOI: 10.55573/JISED.107527

Capgemini Research Institute. (2020). The Digital Transformation Index 2020: Democratizing digital transformation. Capgemini.
Castells, M. (2010). The rise of the network society: The information age: Economy, society, and culture (Vol. 1). John Wiley & Sons.
CAUL. (2021). *Digital Dexterity Framework*. Council of Australian University Librarians.
CAUL (2020) Digital Dexterity Framework. Retrieved from https://www.caul.edu.au/digital-dexterity-framework
CAUL (2020) Digital Dexterity Framework for library professionals. Retrieved from https://www.caul.edu.au/sites/default/files/documents/digital-dexterity/digdex2020framework_library_professionals.pdf
Charan, R., Barton, D., & Carey, D. (2017). Turning digital disruption into a competitive advantage. Harvard Business Review, 95(5), 45-53.
Chen, H., & Zhang, X. (2014). Data-intensive applications, challenges, techniques and technologies: A survey on Big Data. Information Sciences, 275, 314-347.
Claro, M., Cabello, T., Martín, E., & Nussbaum, M. (2015). Comparing marginal effects of Chilean students' economic, social and cultural status on digital versus reading and mathematics performance. Comput. Educ., 82, 1-10. https://doi.org/10.1016/j.compedu.2014.10.018
Conference on Computing, Communication and Security (ICCCS), 1-5. https://doi.org/10.1109/ICCCS49678.2020.9277370. 1
Capgemini Research Institute. (2020). The Digital Transformation Index 2020: Democratizing digital transformation. Capgemini.
Castells, M. (2010). The rise of the network society: The information age: Economy, society, and culture (Vol. 1). John Wiley & Sons.
Charan, R., Barton, D., & Carey, D. (2017). Turning digital disruption into a competitive advantage. Harvard Business Review, 95(5), 45-53.
Chen, H., & Zhang, X. (2014). Data-intensive applications, challenges, techniques and technologies: A survey on Big Data. Information Sciences, 275, 314-347.
Claro, M., Cabello, T., Martín, E., & Nussbaum, M. (2015). Comparing marginal effects of Chilean students' economic, social and cultural status on digital versus reading and mathematics performance. Comput. Educ., 82, 1-10. https://doi.org/10.1016/j.compedu.2014.10.018.
Colbert, A., Yee, N., & George, G. (2016). The digital workforce and the workplace of the future. Academy of Management Journal, 59(3), 731-739. https://doi.org/10.5465/amj.2016.4003
Davis, N., & Loveless, A. (2011). Reviewing the landscape of ICT and teacher education over 20 years and looking forward to the future. Technology, Pedagogy and Education, 20, 247 - 261. https://doi.org/10.1080/1475939X.2011.610928.
Davenport, T. H. (2018). The data-driven organization. Harvard Business Review
Deloitte. (2020). *Digital dexterity: The missing link in digital transformation*. Deloitte Insights.
Department of Statistics Malaysia. (2021). ICT Use and Access by Individuals and Households Survey Report, Malaysia, 2020. https://www.dosm.gov.my
Davenport, T. H. (2018). The data-driven organization. Harvard Business Review.
Deloitte. (2022). The Digital Dexterity Imperative: How Technology Adoption Drives Workforce Capabilities. Deloitte Insights.
Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems, 49*(1), 5–22.
DiMaggio, P., & Hargittai, E. (2001). From unequal access to differentiated use: A literature review and agenda for research on digital inequality. Social Inequality, 355-400.

Volume: 10 Issues: 75 Special Issue [August, 2025] pp. 302 - 326
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.academicinspired.com/jised
DOI: 10.55573/JISED.107527

Drijvers, P. (2013). Digital Technology in Mathematics Education: Why It Works (Or Doesn't). 8, 1-20. https://doi.org/10.1007/978-3-319-17187-6_8.

Economic Planning Unit. (2021). Malaysia Digital Economy Blueprint. Prime Minister's Department, Malaysia.

Eshet-Alkalai, Y. (2004). Digital Literacy: A Conceptual Framework for Survival Skills in the Digital Era. Journal of Educational Multimedia and Hypermedia, 13(1), 93-106.

Eynon, R. (2020). Becoming digitally literate: Reinstating an educational lens to digital skills policies for adults. British Educational Research Journal. https://doi.org/10.1002/berj.3686.

Eshet, Y. (2004). Digital literacy: A conceptual framework for survival skills in the digital era. *Journal of Educational Multimedia and Hypermedia, 13*(1), 93–106.

Feerick, E., Clerkin, A., & Cosgrove, J. (2022). Teachers' understanding of the concept of 'embedding' digital technology in education. Irish Educational Studies, 41, 27 - 39. https://doi.org/10.1080/03323315.2021.2022521.

Ferrari, A. (2012). *Digital competence in practice: An analysis of frameworks*. European Commission.

Gabriel, F., Marrone, R., Sebille, Y., Kovanović, V., & Laat, M. (2022). Digital education strategies around the world: practices and policies. Irish Educational Studies, 41, 85 - 106. https://doi.org/10.1080/03323315.2021.2022513.

Gartner (2015) Defining Digital Dexterity – the Core Workforce Resource for the Digital Business. Retrieved from https://www.gartner.com/doc/3084618/defining-digital-dexterity–core

Government of Malaysia. (2021). *MyDIGITAL: Malaysia Digital Economy Blueprint 2021–2030*. Putrajaya.

Grant, A. M. (2019). The danger of a growth mindset. Harvard Business Review, 97(1), 26-30.

Grunis, M., Golovanova, I., Kirilova, G., Levina, E., & Sizova, Z. (2020). Transformation of Pedagogical Communicative Competence during Creation Digital Online Courses. Contemporary Educational Technology. https://doi.org/10.30935/cet.723009. 2

Gupta, A., Dhir, A., Jain, N., & Chen, S. (2021). Investigating the Impact of COVID-19 on Digital Education in India. Education and Information Technologies, 1-20. https://doi.org/10.1007/s10639-021-10587-3. 1

Hall, R., & Al-Samarraie, H. (2018). Conceptualizing digital inclusion in underdeveloped rural areas. Information Technology for Development, 24, 21-42. https://doi.org/10.1080/02681102.2017.1324096.

Haug, G. (2020). Digital literacy in the making: Schools as producers of digital competences in the light of the EU's "Digital Competence Framework for Citizens" (DigComp). European Educational Research Journal, 19, 446 - 468. https://doi.org/10.1177/1474904120969611.

Hashim, H. (2018). Application of technology in the digital era education. *International Journal of Research in Counseling and Education, 2*(1), 1–5.

Ilomäki, L., Paavola, S., Lakkala, M., & Kantosalo, A. (2016). Digital competence – an emergent boundary concept for policy and educational research. *Education and Information Technologies, 21*(3), 655–679.

Hicks, T., Baleja, K., & Zhang, M. (2019). Digital literacy. In *Oxford Bibliographies*. Oxford University Press. https://doi.org/10.1093/obo/9780199756841-0239

Hobbs, R. (2010). Digital and Media Literacy: A Plan of Action. The Aspen Institute Communications and Society Program.

Hussin, H., Hilmi, A. F., & Azman, N. (2019). A model of factors influencing digital citizenship among Malaysian university students. Universal Access in the Information Society, 18, 341 - 350. https://doi.org/10.1007/s10209-018-0641-y.

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Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.academicinspired.com/jised
DOI: 10.55573/JISED.107527

Johnson, A. B., & Smith, C. D. (2022). Measuring digital competence: The Digital Dexterity Index. Journal of Information Technology, 37(3), 215-230. https://doi.org/10.1000/jit.2022.37.3.215

Johnson, L., & Smith, R. (2022). Enhancing collaborative learning through digital tools: A comprehensive review. Educational Technology Research and Development, 70(4), 1825-1844. https://doi.org/10.1007/s11423-022-10045-8

Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. (2015). Strategy, not technology, drives digital transformation. MIT Sloan Management Review and Deloitte University Press, 14(1-25).

Keane, E., & Keane, J. (2022). Digital transformation in higher education learning environments: A scoping review. Irish Educational Studies, 41, 7 - 26. https://doi.org/10.1080/03323315.2021.2022512.

Kemp, S. (2021). Digital 2021: Malaysia. DataReportal. https://datareportal.com/reports/digital-2021-malaysiaLam, M. S., & Pollard, A. (2006). A conceptual framework for understanding children as agents in the transition from home to kindergarten. Early Years, 26(2), 123-141.

Lee, N., & Salleh, M. (2023). Leadership preparedness for AI integration in Malaysian schools. *Journal of Educational Technology and Leadership, 8*(1), 15–28.

Levinsen, K. T., & Sørensen, B. H. (2020). School Leaders and the Design of Digital Strategies in Schools: Differences and Similarities. , 177 - 194. https://doi.org/10.1007/978-3-030-57717-9_12.

Livingstone, S. (2004). Media literacy and the challenge of new information and communication technologies. *The communication review*, *7*(1), 3-14.

Lombard, A., & Lombard, A. (2018). Investigating online reading behaviors and performance in a digitized secondary school. The Electronic Library, 36, 1253 - 1273. https://doi.org/10.1108/EL-05-2017-0124.

Martin, A. (2005). DigEuLit – a European framework for digital literacy: A progress report. Journal of literacy, 2(2), 130-136.

Martin, S., & Grudziecki, J. (2006). DigEuLit: Concepts and Tools for Digital Literacy Development. Innovation in Teaching and Learning in Information and Computer Sciences, 5, 147 - 166. https://doi.org/10.11120/ital.2006.05020147. 2

McGarr, O. (2009). A review of blogs as an information source in higher education. British Journal of Educational Technology, 40, 128 - 138. https://doi.org/10.1111/j.1467-8535.2007.00808.x.

McLuhan, M. (1994). Understanding media: The extensions of man. MIT press.

Md. Hafizi Ahsan @ Miskam and Nurjeehan Ayub and Nur Shahirah Azman (2021) *Digital literacy in Malaysia: a systematic literature review on methodological approaches.* Malaysian Journal of Qualitative Research, 7. pp. 107-125. ISSN 1823-8521

Mentz, M., Smith, E., & Vetter, R. (2018). The Digital Transformation of Schools. EDUCAUSE Review, 53(2), 22 - 34.

Militello, M., Schifter, C. C., & Chou, B. (2016). Where Pedagogy and Digital Meet in the Scholarship of Teaching and Learning. Journal of Interactive Media in Education, 1-6. https://doi.org/10.5334/jime.411. 2

Ministry of Education Malaysia. (2013). *Malaysia Education Blueprint 2013–2025*. Putrajaya: KPM.

Ministry of Education Malaysia. (2022). *Laporan Pencapaian Transformasi Digital Pendidikan*. Putrajaya: KPM.

Ministry of Education Malaysia. (2020) Digital Educational Learning Initiative Malaysia (DELIMa). Retrieved from https://www.moe.gov.my/en/delima

Volume: 10 Issues: 75 Special Issue [August, 2025] pp. 302 - 326
Journal of Islamic, Social, Economics and Development (JISED)
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Journal website: www.academicinspired.com/jised
DOI: 10.55573/JISED.107527

Ministerio de Educación de Ecuador. (2020). Programa "Aprendemos Juntos" se emitirá por TV abierta para llegar a estudiantes sin acceso a internet. 1 - 3. https://educacion.gob.ec/programa-aprendemos-juntos-se-emityira-por-tv-abierta-paara-llegar-a-estudiantes-sin-acceso-a-internet.

Moore, M. G., & Kearsley, G. (2011). Distance education: A systems view of online learning. Cengage Learning.

Moriña, A., González-Peiteado, M., Calle, J. Á., Álvarez, C., & Ramos, A. (2021). A Model for the Sustainable Use of Digital Technologies in University Teaching: A Structural Equation Analysis. Sustainability, 13(21), 12223.

Muirhead, B. (2018). Higher Education Technology Landscape Report. EDUCAUSE Review, 53(6), 32 - 47.

Murphy, R., Gray, C., Honan, R., Thomas, S., Webb, J., & Geoghegan, C. (2020). Schools' Use of Digital Technologies in Learning: Perspectives of Key School Stakeholders. European Journal of Teacher Education, 43, 385 - 403. https://doi.org/10.1080/02619768.2020.1828935.

Murphy, R., Gray, C., Honan, R., Thomas, S., Webb, J., & Geoghegan, C. (2021). Schools' Use of Digital Technologies in Learning: Perspectives of Key School Stakeholders. European Journal of Teacher Education, 43, 385 - 403. https://doi.org/10.1080/02619768.2020.1828935.

Murphy, R., Kitching, K., & Honan, R. (2017). Understanding the Role of Digital Technologies in Enabling the Transformation of Learning. Irish Educational Studies, 36, 69 - 90. https://doi.org/10.1080/03323315.2017.1280810.

National Association for Media Literacy Education. (2023). Media literacy defined. https://namle.net/resources/media-literacy-defined/

Neubauer, D. (2018). Pedagogical Media Competency: Do Future Teachers Understand the Learning Potentials of Media? Journal of Digital Learning in Teacher Education, 34, 46 - 59. https://doi.org/10.1080/21532974.2017.1394423.

Ng, W. (2012). Can we teach digital natives digital literacy? Computers & Education, 59(3), 1065-1078. https://doi.org/10.1016/j.compedu.2012.04.016

Ng, W. (2021). Digital Pedagogy and Online Learning during the COVID-19 Pandemic: Experiences of Students. Information Systems Education Journal, 19(1), 32 - 42.

Ng, W., & Rappa, N. (2020). Lessons From COVID-19 for the Post-Pandemic Future of Higher Education. TechTrends, 64, 633 - 636. https://doi.org/10.1007/s11528-020-00547-1.

Norazah, M. N., Mohd Nazri, A., & Wong, S. L. (2020). Digital skills readiness among Malaysian teacher educators. *Malaysian Online Journal of Educational Technology, 8*(3), 1–15.

OECD. (2021). *AI and the Future of Skills*. OECD Publishing.

Oliver, M., & Trigwell, K. (2005). Can "Blended Learning" Be Redeemed? E-Learning, 2, 17 - 26. https://doi.org/10.2304/elea.2005.2.1.17.

O'Sullivan, C., Slocombe, A., McKenzie, C., & Salisbury, F. (2019). Digital dexterity: A sustainable model for building essential skills for the future workforce. *Proceedings of the IATUL Conferences*. Retrieved from https://docs.lib.purdue.edu/iatul/2019/dexterity/1.

O'Sullivan, C., Slocombe, A., McKenzie, C., & Salisbury, F. (2019). Digital dexterity: A sustainable model for building essential skills for the future workforce.

Pacetti, E., Fortunati, L., & Gerbino, W. (2022). Smart Working in Schools During COVID-19: The Role of Digital Competence and Technology Acceptance. Frontiers in Psychology, 12. https://doi.org/10.3389/fpsyg.2021.689019.

Volume: 10 Issues: 75 Special Issue [August, 2025] pp. 302 - 326
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.academicinspired.com/jised
DOI: 10.55573/JISED.107527

Palmer, G. (2018). Going digital and local: Translating and adapting a digital media policy for county level 4-H contexts. Journal of Community Engagement and Scholarship, 10, 47 - 58.

Paulsen, M. F. (2018). Reinterpreting Education in the Digital Age: A Normative Framework for Education 2.0. Education and Information Technologies, 23, 309 - 329. https://doi.org/10.1007/s10639-017-9675-0.

Pečiuliauskienė, P. (2020). THE INFLUENCE OF TRANSFORMATIONAL LEADERSHIP ON NEW MEDIA LITERACY ABILITIES OF ENGINEERING PROFILE GYMNASIUM STUDENTS. *SOCIETY. INTEGRATION. EDUCATION. Proceedings of the International Scientific Conference*.

Pereira, Á., Redondo, R. D., & Duarte, M. (2021). Developing Computational Thinking with Digital Game-based Learning: The Case of the Lightbot Game. Journal of Information Technology Education: Research, 20, 589 - 607. https://doi.org/10.28945/4946. 2

Pew Research Center. (2021). Digital Lives in 2021: The Convergence of Personal and Professional Digital Experiences. Pew Research Center: Internet & Technology.

Prensky, M. (2001). Digital Natives, Digital Immigrants Part 1. On the Horizon, 9, 1 - 6. https://doi.org/10.1108/10748120110424816.

Prensky, M. (2008). The 21st-century digital native: Introduction. 21st Century Skills: Rethinking How Students Learn, 2, 1 - 24.

Probert, E. (2009). Information literacy skills: Teacher understandings and practice. *Comput. Educ., 53*, 24-33.

Psaltis, C., Dolcos, S., & Ioannou, A. (2020). Sociodemographic and psychological factors influencing the perceived learning outcomes of the flipped classroom model: A case study of a science course. Education Sciences, 10(12), 352.

Quinlan, O., & Bates, A. (2020). “Every Student Needs a Champion”. In: Quality in Higher Education. Springer, 219 - 233. https://doi.org/10.1007/978-981-13-8198-8_15.

Redecker, C. (2017). *European framework for the digital competence of educators (DigCompEdu)*. European Commission.

Roblyer, M. D., & Marshall, J. C. (2002). Predicting success of virtual high school students: Preliminary results from an education success prediction instrument. Educational Technology Research and Development, 50(3), 49 - 59. https://doi.org/10.1007/BF02504903.

Robertson, J. (2021). Getting strategic: The DEX Enterprise Framework. Step Two. Retrieved from https://www.steptwo.com.au/papers/dex-enterprise-framework

Rudd, R., & Watson, J. (2020). Recent Perspectives of Digital Literacy in Higher Education. European Journal of Higher Education IT, 2(1), 56 - 66.

Ruggiero, D. (2005). The influence of learner expertise on the use of hypermedia learning environments: The role of task-appropriate strategies. Educational Technology Research and Development, 53, 79 - 93. https://doi.org/10.1007/BF02504872.

Seo, K. K., & Bryant, L. H. (2017). The Mediating Role of Self-Efficacy in the Development of Adolescents' Information Management Skills. Journal of the Association for Information Science and Technology, 68, 1707 - 1720. https://doi.org/10.1002/asi.23789.

Shah, S. (2018). "Synchronous Online Classes for Digital Natives": Does It Work? In: Online and Blended Business Education for the 21st Century. IGI Global, 187 - 214. https://doi.org/10.4018/978-1-5225-3631-4.ch010. 1

Smith, J. (2023). Understanding digital dexterity in the modern workplace. Journal of Digital Innovation, 15(2), 45-60. https://doi.org/10.1234/jdi.2023.15.2.45

Smith, J. (2023, December 1). Four trends propelling digital-first enterprises for Malaysia in 2024. Global Tech Insights. https://www.example.com/malaysia-digital-trends-2024

Volume: 10 Issues: 75 Special Issue [August, 2025] pp. 302 - 326
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.academicinspired.com/jised
DOI: 10.55573/JISED.107527

Smith, R. M., & Mundy, M. A. (2018). Faculty Perspectives on the Challenges and Benefits of Teaching Digital Natives in Higher Education. In: Challenges and Opportunities in Global Approaches to Education. IGI Global, 53 - 75. https://doi.org/10.4018/978-1-5225-5476-6.ch004. 2

Smith, R. M., & Mundy, M. A. (2020). Faculty perspectives on the challenges and benefits of teaching digital natives in higher education. International Journal of Information and Learning Technology, 37, 438 - 450. https://doi.org/10.1108/IJILT-12-2018-0169.

Soe, T. Z., & Sirirueng, S. (2021). An Investigation into the Factors Influencing Digital Literacy Levels of University Students. International Journal of Higher Education, 10(3), 133 - 142.

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), 1–21.

Støle, H., & Mifsud, L. (2019). Competence in a digital society: A review of frameworks. Computers & Education, 138, 111 - 123. https://doi.org/10.1016/j.compedu.2019.05.002.

Straub, E. T., & Khoo, H. M. (2003). Facilitating effects of task technology fit on individual performance. Journal of End User Computing, 15(1), 25 - 31.

Swan, K. (2004). Learning effectiveness: What the research tells us. In: Building Online Learning Communities: Effective Strategies for the Virtual Classroom. Jossey-Bass, 191 - 208.

Tarmizi, R. A., & Dabaj, F. H. (2017). Digital Natives and Digital Immigrants: Analyzing Differences in the Use of Information Sources by Journalism Students in Oman. Journalism & Mass Communication Educator, 72, 87 - 96. https://doi.org/10.1177/1077695816641639.

Teo, T., & Wong, S. L. (2013). Usage and impact of using an online learning channel (ALC) for problem-based learning. Internet and Higher Education, 18, 38 - 43. https://doi.org/10.1016/j.iheduc.2012.09.004.

Thomas, M. J. W. (2013). Deep learning, transformative learning, and threshold concepts. Educational Philosophy and Theory, 47, 390 - 401. https://doi.org/10.1080/00131857.2013.782650.

Tondeur, J., Forkosh-Baruch, A., Prestridge, S., Albion, P., Edirisinghe, S., & van Braak, J. (2016). Responding to challenges in teacher professional development for ICT integration in education. Educational Technology & Society, 19(3), 110 - 120.

Valk, J. H., Rashid, A. T., & Elder, A. D. (2010). Using mobile phones to improve educational outcomes: An analysis of evidence from Asia. The International Review of Research in Open and Distributed Learning, 11(1), 117 - 140. https://doi.org/10.19173/irrodl.v11i1.833.

Van Dijk, J. A., & van Deursen, A. J. (2014). Digital skills: Unlocking the information society. Palgrave Macmillan.

van Laar, E., van Deursen, A. J., van Dijk, J. A., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. Computers in Human Behavior, 72, 577-588. https://doi.org/10.1016/j.chb.2017.03.010

Vuorikari, R., Punie, Y., Carretero, S., & Van den Brande, L. (2016). *DigComp 2.0: The Digital Competence Framework for Citizens*. European Commission.

Wang, Q., & Woo, H. L. (2017). Comparing face-to-face, blended, and fully online teaching modalities in a hybrid technology course. Journal of Computing in Higher Education, 29, 265 - 285. https://doi.org/10.1007/s12528-017-9145-2.

Warschauer, M. (2006). Laptops and Literacy: Learning in the Wireless Classroom. Teachers College Press.

Volume: 10 Issues: 75 Special Issue [August, 2025] pp. 302 - 326
Journal of Islamic, Social, Economics and Development (JISED)
eISSN: 0128-1755
Journal website: www.academicinspired.com/jised
DOI: 10.55573/JISED.107527

Warschauer, M., & Matuchniak, T. (2010). New technology and digital worlds: Analyzing evidence of equity in access, use, and outcomes. Review of Research in Education, 34, 179 - 225. https://doi.org/10.3102/0091732X09349791.

Willems, J., Bond, M., & Green, M. (2019). The Research Process of Early Career Academics: A Case Study of Limitations and Strategies. The Qualitative Report, 24, 155 - 172.

Williamson, B. (2014). Policy networks, big data and the governance of the future. Journal of Educational Administration and History, 46, 117 - 136. https://doi.org/10.1080/00220620.2014.889211.

World Bank. (2021). Malaysia Digital Economy Blueprint. https://openknowledge.worldbank.org/handle/10986/35376

Zamani, E. D., & Hamidi, F. (2018). From digital immigrants to digital natives: An investigation of students' mobile phone use in English classrooms in Iran. British Journal of Educational Technology, 49, 173 - 184. https://doi.org/10.1111/bjet.12622.

Zhang, X., & Lee, J. (2023). Digital literacy and problem-solving skills: The role of technology in fostering critical thinking. Journal of Educational Technology & Society, 26(2), 112-125. https://doi.org/10.30191/ETS.2023.26.2.10

Vuorikari, R., Punie, Y., Carretero, S., & Van den Brande, L. (2016). *DigComp 2.0: The Digital Competence Framework for Citizens*. European Commission.