

# The Drive of Digital Literacy Skills in the 21<sup>st</sup> Century

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**Abstract**— With the advent of technology, the internet is the main source often to millions of answers. By clicking one button, it answers many questions one might have. However, the certainty of what is right or wrong, true or false is ambiguous. Literacy in the 21st century is about constructing and validating knowledge. The more information there is, the more readers have to know how to navigate through ambiguity and triangulate and validate viewpoints. As such, learning in a digital world has become more challenging today. With the mass media content, information on the internet contributes to the misinformation itself, fake news, information bias, or even truthfulness of the posted information. Hence, acquiring digital skills in this era is essential for internet users, particularly students who make up the majority of the internet users. With the COVID-19 pandemic and school closures, students have to school from home on their own. This crisis may explain that it is urgent to develop autonomous and advanced digital skills to prepare students in the online learning environment. Educators and learners are becoming more dependent on the internet. Therefore, this paper proposes the needed skills in reading digitally for online students.

**Keywords**—digital skills, online learners

## I. Introduction

The COVID-19 outbreak in 2020 has evidently changed the scenario of education completely. In March 2020, schools in Malaysia were forced to close leaving parents to be teachers coping with teaching at home and monitored by teachers online. As school goes fully online, learning time for students was shortened making more leisure time at home.

As this scenario continues, students opt for ways to occupy their time by surfing the internet. The amount

of time spent on social media increases as they continue to spend time on the internet. A newspaper reported the average amount of time spent was between 12 to 14 hours daily (Ming, Teoh, 2020). According to a UNICEF survey done in four southeast Asia countries which were Malaysia, Indonesia, Cambodia, and Thailand, 92% of children aged between 5 to 17 years old are internet users who own smartphones and have social media accounts (UNICEF, 2020). One in three internet users are children and over 175,000 children go online for the first time every day. From this, 84.7% download images, movies, videos, or music and play games. 97% connect on social media and chat applications, 83.5% search for information, 77.1% are used for downloading applications, and 77.4% for internet calls. This statistic is described in Figure 1. The survey was done across 301 boys and girls where 127 of them were from Malaysia. The top online activities among them were text communication, social networking, online research, and watching videos.

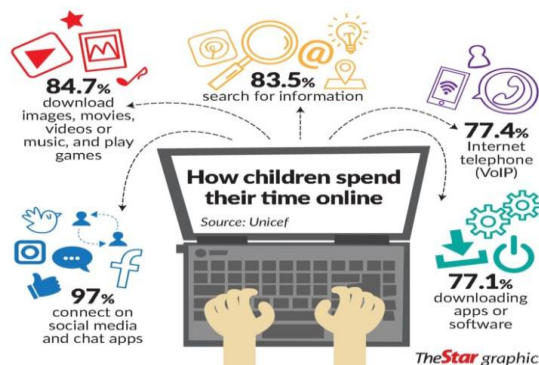


Fig.1 Graphic Data of Online Activities Children Spend on the Internet (Graphic from <https://www.thestar.com.my/lifestyle/family/2020/11/20/barriers-to-online-learning>)

Using the internet has become the main source for students to learn. Nevertheless, the switch to online learning has also deepened the exposure to cyber threats and appropriate online socialization. The survey also reported the mishaps or the negative encounters of learners when they go online. 60% of the students were threatened with these negative encounters in which 45% were threatened by cyberbullies, 13% were affected by gaming disorders, 29% of exposure to sexual grooming and violence, 17% had risky contact offline meeting strangers or sexual contacts and 7% were at risk of social media disorder (DQ Institute Org, 2020).

With this worrying data, emphasis should be given to developing digital skills when students go online. Therefore, this review paper looks into 21st-century digital skills. The review is based on models and frameworks that have been funded and adapted by countries in the world. The review of models is ranged by age group of the learners. The overview of the review hopes to help the educational experts to reconnoiter digital literacy in the 21<sup>st</sup> century.

## II. LITERATURE REVIEW

### *Digital Literacy Framework*

The Organization for Economic Cooperation and Development (OECD) Learning Framework 2030 highlighted that digital literacy is a fundamental competency for future education (OECD, 2018). This set of fundamentally accepted standard frameworks was used and established according to the global standard. The framework is designed to believe that digital intelligence is a universal human right and can enable the sustainable development of nations with more inclusive growth, wellbeing, and prosperity.

For the framework to be feasible, the OECD has identified the match of digital literacy skills by taking into account the factors that contributed to the skills. Students, teachers, school leaders, parents, national and local policymakers, academic experts, unions, and social and business partners have worked as one to develop this framework. Although minimizing the factors will make the framework function ideally, there are a few challenges that need to be addressed.

The first challenge was the needs and requests of parents, universities, employers, and schools in dealing with curriculum overload. As a result, students often lack sufficient time to master key disciplinary concepts or in the interests of a balanced life to nurture friendships, to sleep, and to exercise. It is time to shift the focus of our students from "more hours for learning" to "quality learning time". Secondly, time lags between

recognition, decision making, implementation, and impact. The gap between the intent of the curriculum and learning outcome is generally too wide. Thirdly, the content must be of high quality if students are to engage in learning and acquire a deeper understanding. Fourthly, the curricula should ensure equity while innovating; all students must benefit from the social, economic, and technological changes. Finally, careful planning and alignment are important for the effective implementation of reforms.

To achieve this goal, a project named #DQEverychild was administered in 80 countries with over 1 million children with the hope to bring together various stakeholders such as content developers, initiative leaders, academic researchers, and educators (Joshua et al., 2021).

#DQEverychild is a collaboration of 80 countries to educate and provide a child readiness kit aimed at 8-12 years old children. It teaches them to have better digital competency. It encompasses a comprehensive 8 days of online learning involving learners and parents. The program aims at reducing risky online behavior and increasing critical thinking, empathy, and competency skills. This is described in Figure 2 below. #DQEveryChild is based in Singapore, with the collaboration from OECD, IEEE SA, World Forum, and DQ Institute.

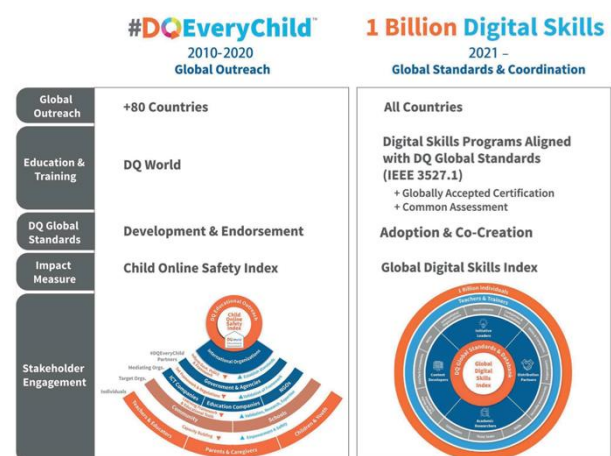


Fig.2: Description of #DQEveryChild program (Graphic from <https://www.dqinstitute.org/>)

Another framework is a collaboration by teachers, education experts, and business leaders to help craft (Framework for 21st Century Learning) skills and knowledge needed for students to overcome 21st-century learning. This framework based in the US is called P21's Framework for 21<sup>st</sup> Century Learning with the aim of readiness for every student and is being used widely in the US. It emphasizes the key subjects and mastery themes such as English, reading, or language arts, world languages; arts; mathematics, economics; science; geography; history; government; and civics with close reference to media influence.

The P21 framework combines the framework with the essential support system such as assessments, curriculum, professional and learning environment to create a more engaging learning process. In brief, Figure 3 depicts the elements of the framework.

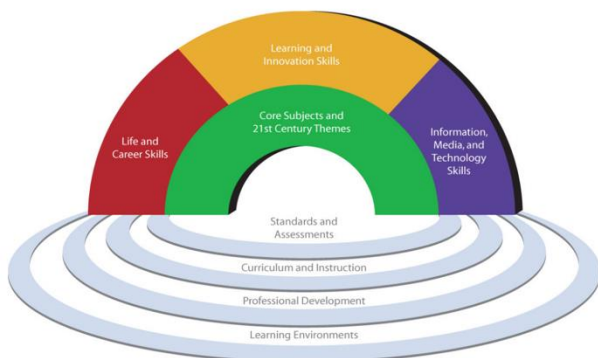


Fig 3: P21 Framework Definition (Graphic from Copyright © 2009, The Partnership for 21st Century Skills. All rights reserved.)

The skills needed for the current support system consist of 4 systems: 21<sup>st</sup> Century Standards, Assessments of 21<sup>st</sup> Century Skill, 21<sup>st</sup> Century Curriculum and Instruction, and the 21<sup>st</sup> Century Professional Development. The 21<sup>st</sup> Century Standard focuses on content knowledge and expertise. It engages students with the real-world data, tools, and experts that they will encounter in their college, career and life. In this system, it is believed that students learn best when actively engaged in solving meaningful problems. The next support system is an assessment of 21st Century skills. It supports a balance of formative and summative classroom assessments. Feedback is emphasized on students' daily performance. Student's portfolio is also developed to exhibit student's mastery of 21st-century skills to educators and employers. This will allow a balanced educational system's effectiveness in reaching high levels of competency skills. The third support system which is the 21<sup>st</sup> Century Curriculum and Instruction teaches 21st-century skills in isolation to the context of the core subjects and themes. It focuses on innovative learning methods by integrating the technology. It provides an opportunity for applying the 21st-century themes and use of supportive technologies and higher-order thinking skills. This support system encourages the integration of community and resources out of school. The last support system, 21<sup>st</sup> Century Professional Development enables educators to collaborate, share best practices and integrate 21st-century contexts such as project-based and other applications for work. It allows support of professional learning among the learners and community. It creates learning practices, human support, and physical environments that will support the teaching and learning of 21st-century learning outcomes. (P21

Partnership for 21st Century Learning: A network for Battelle for Kids, n.d.)

### 21<sup>st</sup> Century Digital Skills

The skills needed for the current 21st-century skills are digital. The (Ester van Laar et al., 2020) literature review acknowledges that both basic skills of internet use and online content should be incorporated in digital skills. The research synthesizes the relevant academic literature which resulted in seven core and five contextual skills. The seven core skills are technical, information management, communication, collaboration, creativity, critical thinking, and problem-solving. These seven skills are needed for performing tasks in a broad range of occupations.

The first skill is technical digital skills. This is a basic skill learners need to acquire. With the rampant changes to technology, this technical skill is essential as a continual effort to keep up with the new technology. According to Fuchs (2010), as new technology is developed; manual labor is being replaced and technology is being integrated into most aspects of work.

The second is information digital skills. Skills like searching, evaluating, and organizing information in a digital environment are significant. According to Ananiadou and Claro (2009), characterized information management is the ability to clearly define information needs, identify digital information, and select digital information effectively and efficiently. As of now, learners use multiple devices therefore, maintaining formation across the digital device is crucial.

The third skill is communication digital skills. It is essential to master the right way of communicating on the internet. Communication using email, social networking sites, and instant messaging services must be done effectively. Learners need to express themselves clearly and be able to interact with others in real-time (Yu et.al., 2010). By communicating via the internet, it can cater to a universal audience and distance at a faster pace.

The fourth skill is collaboration digital skills. Collaboration skill is widely used due to the collaboration software chats such as WhatsApp, Skype, Zoom, and others. This software allows instant interchange of ideas, chats, information, and experience. In today's society, the emergence of online collaborative platforms has made it important to manage the information with others. (Ester van Laar et al., 2020)



The fifth skill is critical thinking and digital skills. According to Starkey (2011), having this skill is essential and crucial as it allows resources to be created with various intentions and competencies. It is significant to assess online content to avoid fake news. The ability to do so is through being able to extract crucial information and communication through critical reflection. According to Dede (2010), incoming online information and communication and extracting valuable information are important to sustain and steer online discussion.

The sixth skill is creative digital skills. Loveless and Ellis (2001) claimed that ICT can develop creativity through curating and realizing ideas. Web 2.0 technology allows such ideas to be produced and shared in creative and new ways. Creativity is much more appreciated in Web 2.0 as it determines the success of whether being well-received by the audience. Video sharing, web-blogging are some common online content creations that portray creativity.

The seventh skill is problem-solving digital skills. ICT has become the main source of problem-solving. Problems are defined differently, and solutions can be easily found online. Barak (2018) elaborated that learner need the skills to find the solution, solve the problem and transfer the knowledge to new situations.

These skills are fundamental for learners in 21<sup>st</sup> Century learning. Being able to be equipped with these skills will help learners to be more vigilant to online content, information, and communication. By acquiring these skills, learners of this century can maximize the usage of online learning. These seven skills were incorporated to form digital literacy in education.

### *Models of Digital literacy in Education*

In the education context, digital literacy is defined as having the knowledge and ability to use a wide range of technology tools for multiple purposes by incorporating digital skills for 21st-century learning. According to Mantiri et al. (2019), the ability to use a computer and putting to use the technology does not make one a digitally literate student. It is more than knowing how to use a smartphone or accessing music on the internet. In another definition by Ng (2012), digital literacy is “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, to enable constructive social action; and to reflect upon this process”. As such, being digitally literate allows one to

have control over the technological tools for various purposes. However, Belshaw (2011) stated that digital literacy is made up of several critical elements and the term digital literacy is ambiguous as it is difficult to assess or measure digital literacy. He further elaborated eight elements as in Figure 4 to define digital literacy.

Students need to have all 8 elements (creative, experiment, communicate, disseminate, take responsibility, work together, exchange, and respectfully discuss opinions) to be digitally literate in the education context. To incorporate all 8 elements, teachers need to redesign their teaching plan to make online lessons more digitally literate. One way of incorporating all 8 elements is by gamifying their lesson in which students get the opportunity to construct knowledge, explore, communicate with other learners via discussion boards, thus making students confident and creative based on their evaluation and synthesis. By exposing lessons that incorporate the elements for digital literacies, learners become more critical and constructive in their online learning.



Fig 4: The Eight Cs of Digital Literacies (graphic from <https://lynhilt.com/what-is-digital-literacy/>)

Using such an approach will help students to hinder inappropriate news or exposure to cyber threats. There is a direct link between the concept of digital literacy, analytical thinking ability, and the intention to create constructive social actions. This approach thus suggests that critical thinking, the ability to objectively analyze information retrieved online, and the aptitude to form independent opinions should be among the central features of digital literacy (Ng, 2012). With this in view, if one is exposed to inappropriate news or cyber threats, one can differentiate between right or wrong by becoming digitally literate. Ng (2012) further elaborated by stating that when a learner is in an online environment, he or she can filter his or her thinking when retrieving information as being digital literate allows the learner to analyze the information critically. Online users must be able to distinguish fake news from genuine news as they must be taught to think critically and encompass their digital literacy skills. Echoing to

this, a similar study of online learning through digital storytelling by Bakar, R. A (2019) revealed that engagement in learning is regarded as a mediator for high learning outcomes in the 21st century.

Another model is the BC Digital Literacy developed by British Columbia K-12 educators. This model is defined by

“The interest, attitude and ability of individuals to use digital technology and communication tools appropriately to access, manage, integrate, analyze and evaluate information, construct new knowledge, and create and communicate with others” (BC’s Digital Literacy Framework, 2021).

This model is governed by 6 components. Firstly, research and information literacy where students apply digital tools to gather, evaluate, and use information. Secondly, critical thinking, problem-solving, and decision-making. In these components, students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. Thirdly, creativity and innovation. In this component, students will demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Fourth, is digital citizenship. In this component, students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. The fifth is communication and collaboration. Here, students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Lastly is technology operations and concepts. In this component, students will demonstrate a sound understanding of technological concepts, systems, and operations. These elements are summarized in Figure 5.

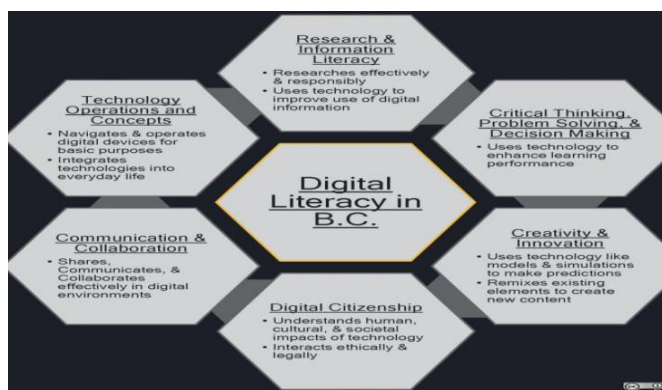


Fig 5: Six Characteristics BC’s Digital Literacy Framework (graphic from <https://www.popk.com/2020/12/13/the-bc-digital-literacy-framework-2/>)

BC’s Digital Literacy Framework works well in Canada’s curriculum as teachers have incorporated it in their lesson plans since 2015. The curriculum was designed to meet the six components thus developing digital literacy among the students.

Similarly, another digital literacy model by Jisc Developing Digital Literacies program shares similar elements with BC’s Digital Literacy Model and Belshaw’s. Jisc Digital literacy program which aims at exploring digital literacies in universities and colleges in the UK throughout 2011 to 2013. The model is defined by a richer set of digital behaviours, practices, and identities over the period, with a broader definition of digital literacies. This model believes in the evolving of digital literacies to a period where skills are developed and built across contexts. The model is based on Beetham and Sharpe’s model (Sharpe & Beetham, 2016) of developing higher-order digital capabilities on a foundation of access and functional skills. This model works on how learners can be motivated to try new technologies and gain new skills by challenges. The seven elements of digital literacy are described in Figure 6. As this model is aimed at tertiary education, it is comprehensive and seen as vital as a support system in the organization or universities. By allowing such elements, it helps to focus on developing institutional technology that meets students’ needs and helps make core institutional systems more usable and personal through student testing of new services and applications.



Fig 6: The Seven Elements of Digital Literacies

This model focuses on user engagement where students become the changing agent. It involves students in the literacy development in which students and staff work effectively due to the empowerment of students in regards that they are more engaging digitally compared to staff. This key concept becomes the fundamental element in this model developed for higher institutions.

### III. DISCUSSION AND CONCLUSION

Based on the reviews being discussed, as educators, we need to align our curriculum to adapt to the current situation of online learning. This paper discusses the framework and the models of selected digital literacy skills based on the implication to the learners. All models share similar elements of digital literacy which are communication, critical thinking, and creativity to develop digitally literate learners. Emphasizing critical thinking on all models is apparent as this will curb and discern unwanted misinformation or disinformation and cyber threats to the learners.

The fact that having digital literacy is vital should not be taken for granted. By equipping them with these skills, students can evaluate sources, hunt for multiple perspectives, navigate across various kinds of media, and integrate their digital knowledge into their base of offline skills, knowledge, capabilities, and ideas.

While we do this, we need to look into situations that may expose learners to being threatened in the web world. Educating them to be digitally literate helps them to be aware of the online dangers. The misconceptions of digital natives of being digital literate on their own are not inherited but it is a skill that needs to be acquired and taught. They must be responsible and have the skill to be able to take a step back and evaluate their online decisions.

Educators should continue to assist learners in the 21<sup>st</sup> century in cultivating critical thinking using technologies although these learners are technologically inclined compared to their teachers. Technology is a resource tool to help learners be more engaging and technology itself does not promise learning.

The landscape of the internet will improve by instilling digital literacy among learners, or internet users. Having digital literacy is a must in accordance with Technology 5.0. Digital literacy should be introduced in the school curriculum as early as in primary school as it guards the learners to be more vigilant and responsible in using the internet.

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