Digital Literacy

21st Century Competences for Our Age

The Building Blocks of Digital Literacy
From Enhancement to Transformation

April 2015

Department of eLearning

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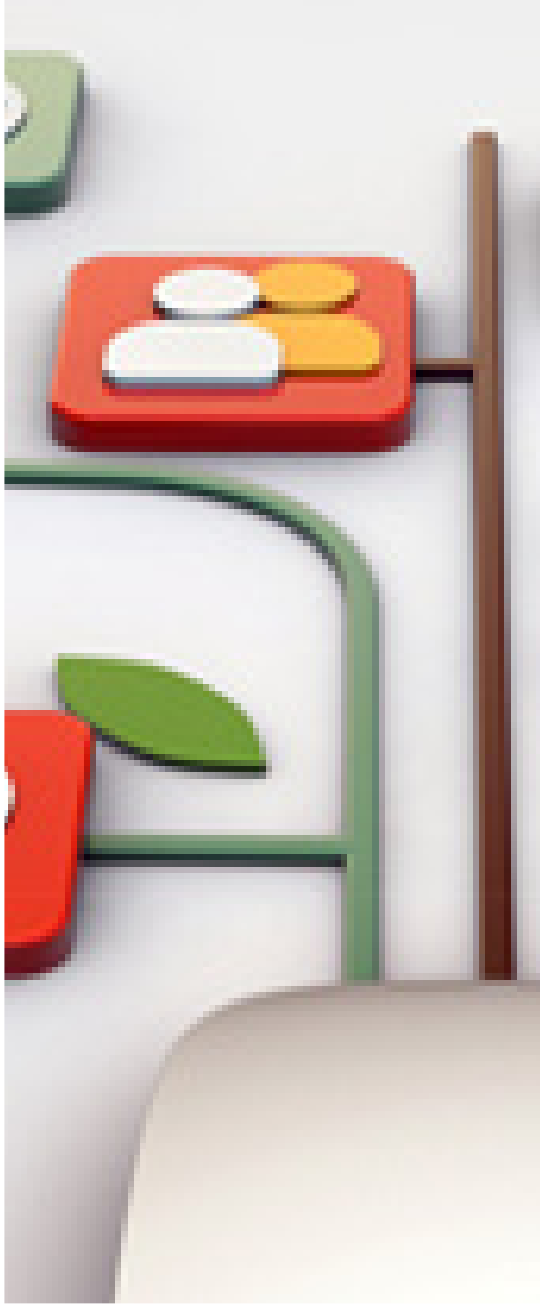

> Learners are entitled to be digitally literate.

Purpose

The purpose of this document is to raise **awareness** of the importance of digital literacy within the education framework in Malta and a chance to **reflect and introspect** on the teaching and learning process.

Objective

The objective of the eLearning Department (eLD) within the Directorate for Quality and Standards in Education (DQSE) in the Ministry for Education and Employment (MEDE) is to help educators make the shift from traditional teaching and a traditional pedagogical approach to a 21st century learning environment. Our objective is to support and guide each teacher to make that shift. This setting is embedded in an interconnected and technology-driven world which has widened the learning place to the virtual, online, remote and anytime conditions. The eLearning Department is committed to progressively show what this environment looks like and how schools can teach 21st century skills as processes.

The eLearning Department in collaboration with the Curriculum Department within DQSE aims to shape the pedagogy since we touch literacies which have mainly been brought about through the digital environment. If a simple, starting definition of digital literacy had to be inserted at this point it would be:

> "Digital literacy is literacy via technology."

However things are not that simple. Literacy is not only the ability to read and write, but rather the ability to put these skills to work in shaping the course of one's own life. The educator Paulo Freire says that literacy is "reading the word and the world."[1] This adds to the complexity since technology is continuously changing the environment we live in.

The eLearning Department believes that changing the way we teach and understanding how we learn in a technology driven world requires a different mind set, in and beyond the classroom. Thus the first step is to help all educators to accept that there is a need for change because the world has changed drastically and is continuously changing at an alarming rate. The second step is to continue to help educators understand that technology can help them achieve easily the heights that are unreachable without digital tools. In practical terms this boils down to tackling literacy beyond the 3Rs and as educators start encompassing the 6Cs of 21st century competences: **collaboration, communication, critical thinking, creativity, citizenship and character education**.

This Digital Literacy document is written for all levels from Kindergarten to Year 12 teachers and education leaders. The 21st century competences are skills, knowledge and attitudes that citizens needs in life beyond school, in their lifelong learning journey.

As we make our way into the second decade of the 21st century, our society is increasingly becoming a digital culture. Learners who are born into this culture are entitled to understand and profit from this environment which is new to us born in the 20th century. They are entitled to be digitally literate.

> "Digital Competence is both a requirement and a right of citizens, if they are to be functional in today's society."
> (Ferrari, 2012)

This entitlement or right puts upon educators the responsibility to nurture and develop a number of competences in students so that they can take part in the social, cultural, economic and intellectual life. Thus becoming active citizens. In this environment, the teacher's role becomes challenging and increasingly more important.

Every educator must understand that digital literacy is essential if we want our citizens to participate in today's modern world. Mark Surman, Executive Director of the Mozilla Foundation, in an interview for the November 2013 editorial in The Telegraph said that digital literacy is as important as reading, writing, arithmetic and other traditional disciplines.

> "Becoming literate in how the technical world works is equivalent to reading, writing and maths. We need to look at this fourth literacy as mainstream."[2]

We know that the technical world is a different place than it was ten years ago. In 2007 the first smart phone was introduced and a new career of app developer was born. How did these first developers get there when there was no prescribed path for them to take? We can list numerous new careers that did not exist ten years ago. A key ingredient in these new jobs is that they require people who are digitally literate. In developed countries, 4 out of the 7 fastest growing jobs directly require technology skills (2 of them being in software development)[3].

1 http://www.jstor.org/discover/10.2307/41405241?uid=3738632&uid=2&uid=4&sid=21106710207423

2 http://www.telegraph.co.uk/education/educationopinion/10436444/Digital-literacy-as-important-as-reading-and-writing.html

3 http://www.usatoday.com/story/money/

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Towards Transformation

In 2001, Marc Prensky coined the terms "digital natives" and "digital migrants" to describe the behavioural differences between Baby Boomers and Generation Z[4]. Prensky argues that those who have grown with ubiquitous access to digital technology think differently to previous generations whose introduction to technology came later on in life. Although the terms have been challenged by many academics, there is much resonance in Prensky's assertion that teaching young people represents a significant challenge for educators, associating digital natives with: speed, multi-tasking, and a preference for graphics over text, random access, social networking, instant gratification, frequent rewards, and games over work.

Today's generation appears to engage with all things that are digital without any effort at all. Young people are born into an interactive, on demand digital culture where they are used to texting, video streaming, mobile Internet and social networking to mention just a few. However, this description, which may have implanted itself in some of us, is a dead metaphor because it veils and conceals a potential problem. While it is true that most of our young people do not need to be persuaded to use technology, and the time they spend glued to what they love doing most quickly improves their skills, research indicates that learners do not really know how to capitalise on technology (Poore, 2011; Mueller et al., 2014; Boyd, 2014). Learners need to acquire digital literacy skills, as without any form of formal guidance, they are likely to remain uninformed and uncritical users of ICT. A couple of visits to Ask.fm is enough to raise concerns about a generation that is not fully digitally literate, yet deeply immersed in cyberspace.

Mitchell Kapor has remarked that, "Getting information off the Internet is like taking a drink from a fire hydrant". With the Internet approaching 1 trillion pages, that statement has never been truer. Every day, every minute, more information is added to the Internet, with no sign of slowing down. Being digitally literate means being able to sift through so much information, being able to understand a message and to communicate it effectively to others in different formats. It means creating, collaborating, communicating, working ethically and understanding when, if and how technology should be used to reach efficiently an objective. So digital literacy involves the critical use of technology. It involves the awareness of and critical analysis of agendas and possible dangers with which technology invades our daily lives. It involves educating students to move from a passive consumer of information to an active producer both as individuals and as part of a community. If our young generation - indeed all citizens - lack digital competences, they risk being disenfranchised when it comes to employment opportunities, democratic participation and social interaction.

Enpowering our students to manage challenges in today's modern world and whatever the future will bring is a core objective of the National Curriculum Framework. Digital literacy is envisaged as a transversal skill across the traditional subjects. Together with the traditional literacy skills of numeracy, listening,

personalfinance/2013/12/08/7-fastest-growing-jobs-in-america/3891571/ (Horizon 2020)

4 Baby boomers describes the cohort of babies born from the end of WWII all the way up to the early 1960s while Gen Z are the group born since just before the start of the Millennium.

speaking, reading and writing, whose main objective is to develop active thinkers who can engage in society in effective and meaningful ways, the digital society requires a larger set of competences (Combes, 2010).

At different stages of their time spent in school, students will be expected to create audio recordings, add visual elements to clarify ideas, thoughts and feelings, and to use technology to interact and collaborate with each other. They will also be expected to collaborate on, produce, peer-edit and publish their writing online. They will be taught how to select their own tools to interact on a wide variety of projects and content areas.

Digital literacy is not a luxury that can wait.

> "We know that the nature of literacy has changed in the digital age, but unfortunately, we do not have decades to catch up to this change."
> (Hicks and Turner, 2013)

Digital Literacy

It is important to put the concept of digital literacy in a historical context. It starts with the term literacy which 3000 years ago meant being an effective public speaker; being able to use the rhetorical tools of persuasion. So literacy in its fundamental sense is the sharing of meaning through language. With Guttenberg, literacy was redefined to include reading and writing. The portable camera brought about the ease of producing and distributing images - so educators introduced the concept of *visual literacy*, highlighting the importance of how to look at images, and understand the way images communicate and carry meaning. The emergence of databases introduced a new wave of powerful technologies to shape shape literacy. These technologies needed a new set of skills, competences and strategies for searching, finding and evaluating information - creating *information literacy*. *Media literacy* followed shortly with hundreds of TV channels to choose from. The microprocessor on our desks created the need for an ICT-literate generation and an entirely new set of technical skills to maximise the potential of the technology.

Twenty years ago being literate meant being able to read and write. Richard Lanham (1995, p. 198) claims that "literacy" has extended its reach from meaning "the ability to read and write" to now meaning "the ability to understand information however presented." We are not just preparing students for today with this new meaning of literacy in mind but also for the future with a shift from consumption to production. The Internet, the World Wide Web, smartphones, Facebook are very recent terms when compared to what has been going on in schools these past 20 years. We are not just consuming what is happening on the web and digital spaces but we are also producing, which requires a sharper level of complexity. So literacy today means much more than the reading of text, which is its original meaning. If you could write your name and you could consume, read directions and read books, you could make sense of the world. But today the production part is as important if not more, than the consumption part. Reading is changing as well. Online reading is different from reading from a book, but the material that we are reading is also changing. The infusion of the visual into texts gives a new dimension to literacy. Literacy needs to encompass understanding and interpretation of the visual symbols of all kinds and images.

Definitions

Digital literacy is an emerging concept. In spite of the seminal work of Paul Gilster, *Definitions of Digital Literacy* (1997), which saw a growing consensus about the term digital literacy the term is still very much contended. Gillen (2010) makes the point that definitions are developed in specific contexts and emerge from different historical contexts. Gillen argues that this leads to the creation of working definitions which target specific audiences. Thus different definitions emerge to address different audiences. On the other hand there are definitions that seek to provide an overarching definition of digital literacy.

The National Curriculum Framework for All (NCF 2012) sees Digital literacy as a cross-curriculuar theme where students will, "acquire skills that include confident and critical use of IT for communication, work and leisure." It is envisaged that students , "Acquire **basic skills in ICT** organised around four major overlapping strands.''

Similarly the Royal Society for DL in the "Shut down or restart" report which came out in January 2012 states:

> "Digital literacy should be understood to mean the **basic skill or ability to use a computer confidently, safely and effectively**, including: the ability to use office software such as word processors, email and presentation software, the ability to create and edit images, audio and video, and the ability to use a web browser and Internet search engines. These are the skills that teachers of other subjects at secondary school should be able to assume that their pupils have, as an analogue of being able to read and write."
> (Royal Society, 2012)

We need to **go beyond a skills based understanding**

of digital literacy. It is erroneous to associate digital literacy with basic computer skills. Such association would be akin to saying that literacy is merely the ability to read and write which is of course a part of literacy but our understanding of literacy is much more. It is about the understanding of meaning and the conveyance of meaning rather than simply reading and writing skill on their own. The emergence of Web 2.0 technologies must be reflected in the definition where the distinction between consumer and producer virtually disappears. This development is addressed in Futurelab's definition who have a subtle and situated understanding of digital literacy. It is largely about understanding and conveying meaning just like literacy but this time mediated through a digital domain.

> "Digital literacy refers to the more subtle and situated practices associated with being able to create, understand and communicate meaning and knowledge in a world in which these processes are increasingly mediated via digital technologies."
> (Futurelab, 2010)

The British Computer Society took a slightly different tack to how digital was to be understood. Much more about the implications of technology for an individual's life in society. They argue that the word **critical** is extremely important and that it is not just accepting these things but the user must have an understanding of how a document has been created.

"Digital literacy provides a critical understanding of technology's impact on society and the individual, including privacy, responsible use, legal and ethical issues."

> (British Computer Society/ Royal Academy of Engineering, 2012)

Finding things on the Internet matters, but an awareness of how a search engine like Google puts those results in order and a basic understanding of Google's business model is important in our understanding of technology's impact on our everyday lives. Similarly the Norwegian Ministry of Modernisation (2005) emphasises the **critical** element in its definition of digital literacy:

> "Digital skills include the ability to exploit the opportunities offered by ICT, and use them critically and innovatively in education and work. Digital skills also include the ability to be critical to sources and assess content. Use of digital tools is a skill the individual must acquire, maintain and continually develop, if he or she is to be a digitally skilled and critical citizen."
> (Cited in Erstad, 2007)

European Commission

The European Commission, which represents the general interests of the European Union (EU), has funded work on the concepts of e-Competences[5] and Digital Competences[6]. Further more, in response to a call for actions on "digital literacy", one of four key strands in the context of the eLearning Programme of the European Commission, the DigEuLit project was proposed. The DigEuLit project declared that the ability to use ICT and the Internet has become a new form of literacy – "digital literacy". They proposed a three stage model of digital literacy and refer to the following three levels:

- **digital competence** that is the skills, concepts, approaches and attitudes;
- **digital usage** that refers to the application of digital competence within a specific context such as a school; and
- **digital transformation** which involves creativity and innovation in the digital domain.

Digital literacy has become a prerequisite for creativity, innovation and entrepreneurship and without it citizens can neither participate fully in society nor acquire the skills and knowledge necessary to live in the 21st century. (European Commission, 2003: 3)

In another working paper, the European Commission (European Commission, 2008) defines digital literacy as:

> "the skills required to achieve digital competence. It is underpinned by basic skills in ICT and the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet".

The definition indicates that digital literacy is comprised of basic ICT skills, which lead to digital competence. However, in the academic field, digital literacy is used as a synonym for digital competence.

Further research carried out by European academics operating within the wider international sphere, talks of how technology affects our daily lives and says that:

> "To participate and take advantage, citizens must be digitally literate - equipped with the skills to benefit from and participate in the Information Society. This includes both the ability to use new ICT tools and the media literacy skills to handle the flood of images, text and audiovisual content that

5 http://www.ecompetences.eu

6 https://ec.europa.eu/jrc/sites/default/files/lb-na-26035-enn.pdf

"Digital literacy refers to the more subtle and situated practices associated with being able to create, understand and communicate meaning and knowledge.
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(Cited in Erstad, 2007)

> constantly pour across the global networks." (Europe's Information Society Thematic Portal, 2007)

This definition considers Digital Literacy and ICT literacy to be one and the same thing. The text goes on to explain how digital literacy is part of the EC i2010. Furthermore the Director General Enterprise and Industry [7]uses the term eskills and focuses on skills at the workplace while differentiating among three groups of users:

1. the ICT practitioner;
2. ICT user;
3. eBusiness or eLeadership.

One of the outcomes of this policy is the reference framework for ICT practitioners already mentioned above: the eCompetence framework.

This Digital Literacy document avoids equating ICT with Digital Literacy but embraces the Digital Competence framework as approached from a lifelong perspective by the European Parliament based on the Communication of the Director General for Education and Culture who defined Digital Competence as one of the 8 Key Competences. In order to create a consensus at the European level about the components of Digital Competence, the DG Education and Culture launched a study with the aim to contribute to a better understanding of digital competence and to develop a framework for Europe.

The Digital Competence framework consists of five areas and 21 competences. Competences are detailed in three proficiency levels. The framework is a matrix which consists of different dimensions that can be presented in several ways. In the original framework (Ferrari, 2013), there are examples of knowledge, skills and attitudes for every competence and also examples on how the competence can be applied for two different purposes (namely: learning and employment).

Five areas of digital competence were identified and can be summarised as follows:

> **1. Information**: to identify, to locate, to retrieve, to store, to organise and analyse digital information, judging its relevance and purpose.
>
> **2. Communication**: to communicate in digital environments, to share resources through online tools, to link with others and to collaborate through digital tools, to interact with and to participate in communities and networks, cross-cultural awareness.
>
> **3. Content-creation:** to create and edit new content (from word processing to images and video); to integrate and re-elaborate previous knowledge and content; to produce creative expressions, media outputs and programming; to deal with and apply intellectual property rights and licences.
>
> **4. Safety:** personal protection, data protection, digital identity protection, security measures, safe and sustainable use.
>
> **5. Problem-solving:** to identify digital needs and resources, to make informed decisions on most appropriate digital tools according to the purpose or need, to solve conceptual problems through digital means, to creatively use technologies, to solve technical problems, to update own and other's competence.

This sample of international definitions shows that there is considerable discussion on terminology, interpretation and representation. While acknowledging the differences and similarities between definitions, and the rapid changes associated with the virtual word, the Department of eLearning is adopting a definition of digital literacy that includes, but goes beyond, simple technological skills. Thus digital literacy will be seen as including the more complex skills of understanding and analysis which lead to deciding and selecting the proper digital tools, be they software or hardware, to create a variety of content. The adopted definition that follows shows that digital literacy requires various abilities and aptitudes. It entails not just technological skills but also critical, reflective, social and ethical practices.

> "Having the knowledge and ability to effectively and critically navigate, evaluate and create information using a range of digital technologies. A digitally literate person can use technology strategically to find and evaluate information, connect and collaborate with others, produce and share original content, and use the Internet and technology tools to achieve many academic, professional and personal goals." (National Lifelong Learning Strategy 2020, Alex Grech, 2014)

7 e-skills/index_en.htm

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(National Lifelong Learning Strategy 2020, Alex Grech, 2014)

Digital Literacy and Citizenship

Digital literacy can be approached from at least two different standpoints: one is from a **conceptual** point of view and the other is from an **operational** standpoint; each comes with its own definitions. Eshet-Alkalai quoted by Bawden (2008) says that there are those who see digital literacy primarily concerned with technical skills and those who see it as focused on cognitive and socio-emotional aspects of working in a digital environment. While the technical aspect must not be ignored, it should be considered as only a small part of a number of building blocks but certainly not the focus of attention. This Digital Literacy document takes the stand claimed by Gilster (1997), Pool (1997), and Lankshear and Knobel (2011) that digital literacy involves "mastering ideas, not keystrokes."

Further more the eLearning Department is looking at Digital Literacy and Digital Citizenship as a hand in glove relationship. Although the two are different they should be done together because improvements in one create improvements in the other. Digital literacy is about knowledge; it is a package of skills that is related to the digital world. This includes the ability to search, to tell the difference between an advert and a scholarly result, between a biased and an impartial, fair result. These all fit into the digital literacy portion.

Digital citizenship is about action. It is about the way one treats and respects other people. In a way digital literacy leads to digital citizenship. When teaching students how to critically engage with the web one actually empowers them to do the same in their relationships on the web. Digital literacy is the essential skills required to consume, synthesise and create. Students may look at something and ask whether it is biased or current, who is writing it and why is it being written. Then the students can take those pieces of information, understand how they are contextualised and ask further questions to see where else and what else is required to fill in gaps. Finally the students come to a point where they will need to formulate an opinion either as as a group who assums different roles or as individuals.

Technology in the classroom

Every piece of technology, whether it is a mobile phone, a PC, tablet or a pencil needs to have its academic potential considered. Mobile phones are currently a banned device in our schools. It is not just the mobile phone's role that needs to be re-examined but any digital device. For that matter it could also be a textbook, a pencil, a rubber or a ruler. It is important to make a shift to a learning environment in which we challenge our students to communicate their understanding of the curricular objectives or learning outcomes that we are looking for in what ever way that speaks to them. For some students that may be using pen and paper, for some students that may be producing a video while for others it may be creating a presentation. It should be up to the students to determine the best way for them to communicate. Irrespective of the technology in the classroom the real question to be asked is, "Are you on task with that?" Whether you are on task with a pencil or on task with a mobile digital device the question is the same.

The cognitive and the infrastructure

We need to make a very important distinction; many people think that when we start talking about 21st century learning and education we are talking about technology and the infrastructure. We are not. When we talk about problem solving, critical thinking, communication, collaboration, creativity or any of the other competences we are talking about the cognitive and not about the hardware. These 21st century competences are thinking skills and have been nicknamed by some as "headware" (not hardware) competences. None of the 21st century competences are computer skills or hardware skills. It is not about teaching a PowerPoint but about teaching how to communicate. The technology can be an engaging and interesting part of the environment but the goal is certainly not to teach technology. The goal is to teach how to think which is applicable across every year and every subject and is not directly related to the amount of technology that we have in schools or to the discrete subjects of ICT or Computing. The tools only help us reach easily what is unreachable without technology.

Reflecting on the foundation blocks

The foundation building blocks for digital literacy are the infrastructure and access to the tools. Infrastructure in schools and beyond has been improving steadily. However, investment in infrastructure alone does not bring about the changes promised by ICT. It is only when we change our mindsets to use them reflectively and strategically, that teaching and learning processes can be deepened. So investment in training on how to use ICT, and working towards a vision of **transformation**, creative thinking and innovation becomes the focus of what needs to be done. The first steps to take in the journey towards transformation in the way we teach and learn is to understand the foundation blocks of digital literacy. The SAMR model (figure 1) is a gradual step by step progression that can be followed in order to change teaching and learning happen in class.

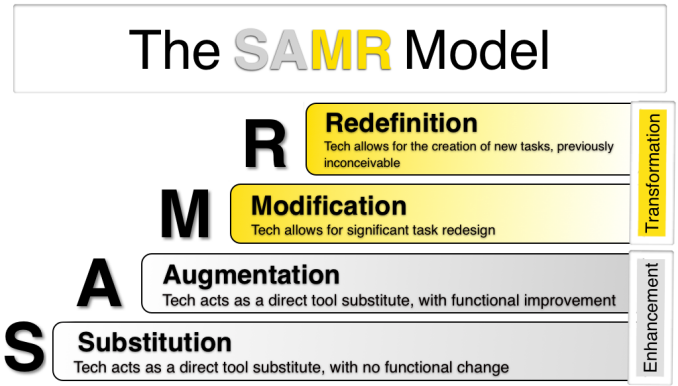

Figure 1 Image by Dr Ruben Puentedura

The SAMR[8] model is more about mindset than technical competence. This model is likened to a "swimming pool" where teaching and learning with technology happens. One starts at the shallow end with a comfortable wade before stepping out of the comfort zone and venture into the deep part.

Henry Jenkins (2006) identified a series of new literacies that are needed to be literate in the 21st century. Among these are simulation, visualisation, collective intelligence and distributed cognition. It is important to emphasize the plurality of digital literacies because of the sheer diversity of specific accounts of digital literacy that exist. The digital literacy document will continue to focus on digital literacy, and retains the term used in the NCF but is to be understood as digital literacies – in the plural.

Figure 2 is based on models described by various researchers in the field of digital literacy and shows how digital literacy incorporates numerous interrelated skills that range from basic awareness to more complex creative and critical literacy and outcomes.

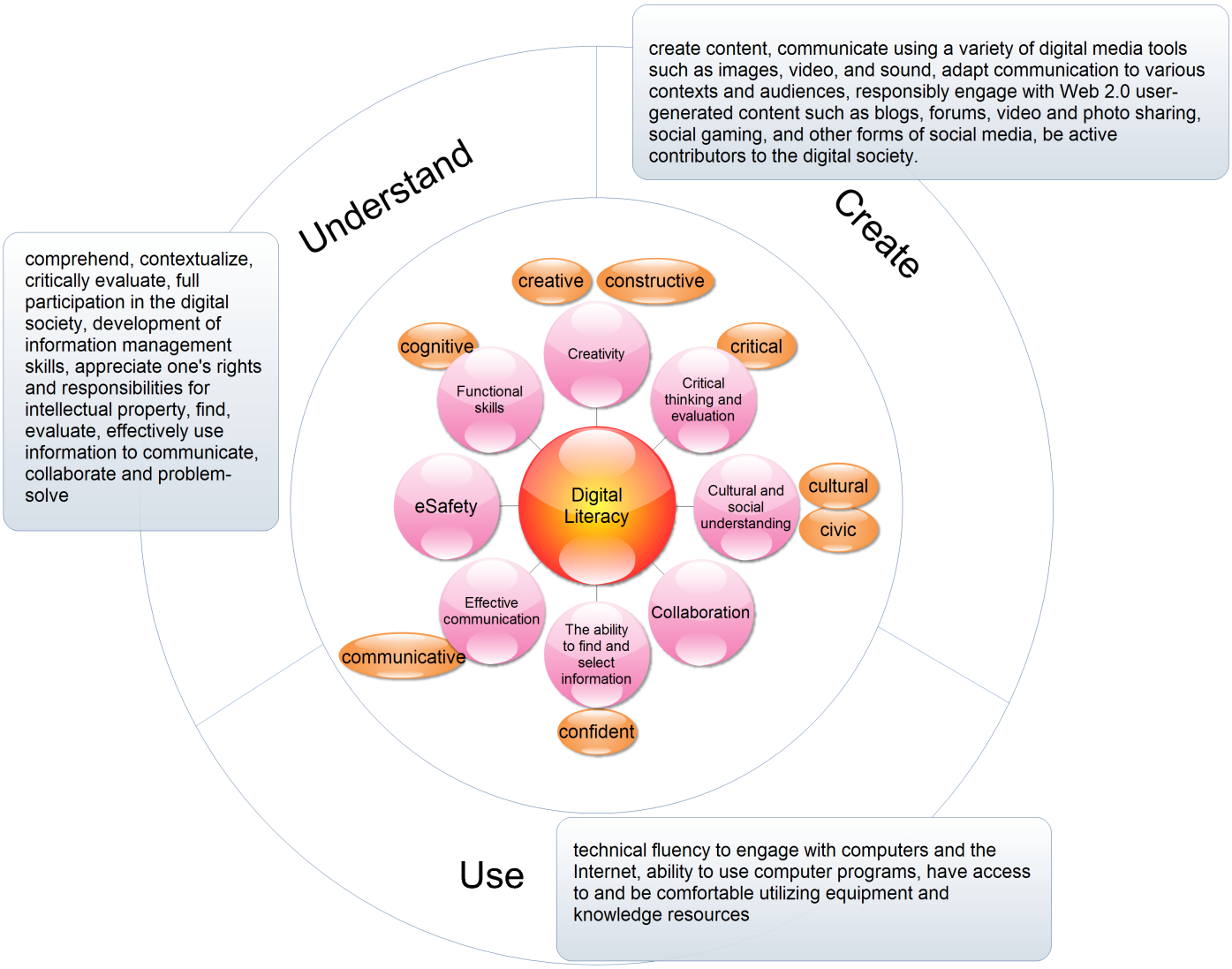

Figure 2 Adapted from Belshaw (2011), Digital Canada 150, Futurelab and European framework for Digital Literacy.

8 http://www.hippasus.com/rrpweblog/

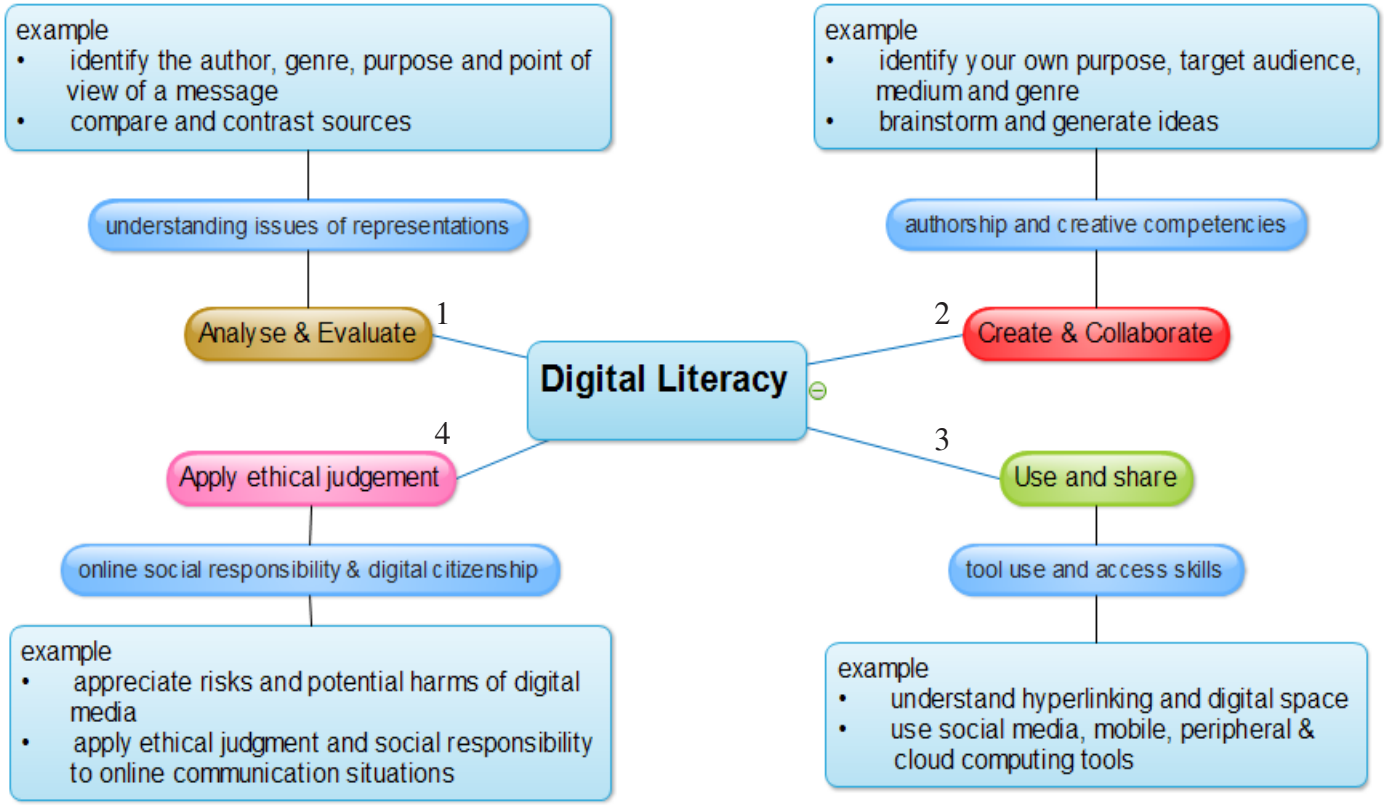

Figure 3 Adapted from Hobbs (2010)

Renee Hobbs describes another model for digital literacy (figure 3) and in her research, published in 2010, she offers a plan of actions to bring a number of competences in focus. In her report, she defines digital literacy as a constellation of life skills that are necessary for full participation in a media-saturated, information-rich society. These include the ability to:

1. **analyse and evaluate;** (understanding issues of representations) Analyze messages in a variety of forms by identifying the author, purpose and point of view, and evaluating the quality and credibility of the content

2. **create and collaborate**; (authorship and creative competences) Take social action by working individually and collaboratively to share knowledge and solve problems in the family, workplace and community, and by participating as a member of a community

3. **use and share**; (tool use and access skills) Create content in a variety of forms, making use of language, images, sound, and new digital tools and technologies

4. **apply ethical judgment;** (online social responsibility & digital citizenship) Make responsible choices and access information by locating and sharing materials and comprehending information and ideas. Reflect on one's own conduct and communication behaviour by applying social responsibility and ethical principles

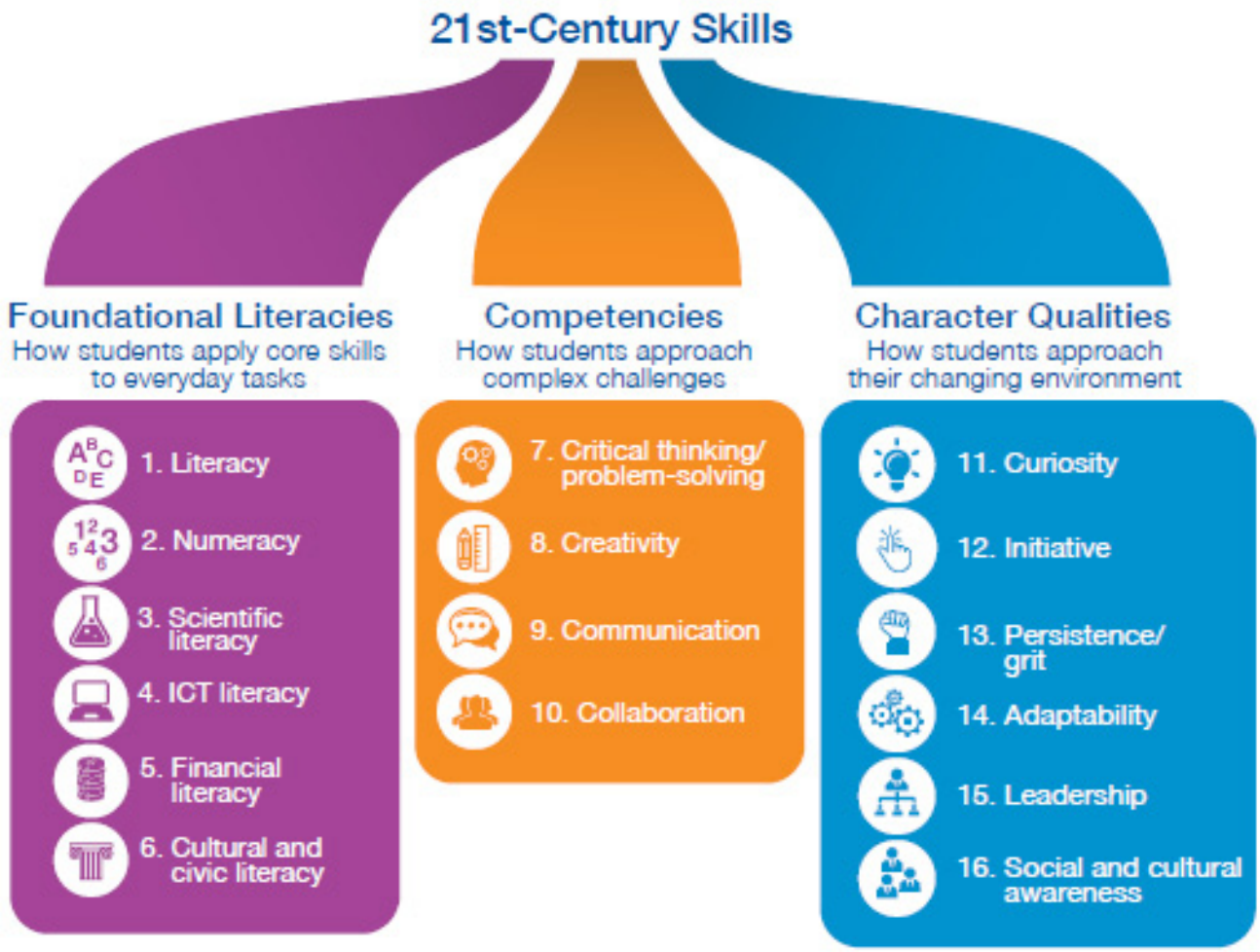

Figure 4. New Vision for education. World Economic Forum & The Boston Consulting Group 2015

The World Economic Forum and the Boston Consulting Group conducted a meta-analysis of research about 21st century skills in Primary and Secondary schools and came up with 16 skills under three broad categories: foundational literacies, competences and character qualities.

The World Economic Forum research reiterates the conclusions that have been described earlier in this Digital Literacy document. Students need to possess not only foundational skills, including languages and mathematics, but they are also expected to be adept at problem solving, and character skills.

Competence and Process

In the 21st century learning environment we need to focus on process which does not fade as quickly as content. Educators need to reflect on what competences look like and teach the processes that achieve them. What is the process for problem solving? What is the process for creativity? Educators cannot just stand over students and tell them to be creative. We need to give the students a skills set and a structured process that they can go through in order to cultivate creativity and the other competences. Thus we need structured processes that can be thought in a structured manner at every age and every subject area. We need a common language that every student, teacher and institution can share, explain, learn, practise and improve upon.

We do identify this need as educators and say that students need problem solving skills but usually that is where it all ends. We need to talk about how to do that. 21st century competences have to be broken down into processes that can be taught, remembered and duplicated. The Global Digital Citizen Foundation[9] has produced a number of tools that define the processes required to achieve the 21st century competences. So in **problem solving** one starts with **defining** the problem, moving to **discovery** which determines how the problem arose, **dreaming** or looking at the solution in the future, **designing** which is mapping out the process for how the problem will be solved, **delivering** that is, actually doing the solution and **debriefing** which is going back and asking how the product or the process can be made better now or in the future. This is a structured process of problem solving.

The competences can all be broken down into processes and there are steps in how this can be done, whether it is creativity, communication, collaboration or critical thinking.

9 https://globaldigitalcitizen.org/21st-century-fluencies/global-digital-citizenship

Conclusion

This document has given an overview of different definitions of Digital Literacy which depend on the audience they are intended for and the background of the authors who propose them. While each of these definitions is valued and weaved into a comprehensive view of a 21st century learner, the required fundamental competences emerge and are highlighted in this document. To be successful in life beyond the school students need problem solving; they need creativity; they need critical and analytical thinking, communication and collaboration skills. To which we need to add the area of citizenship where people learn how to take responsibility for their personal health and well-being, learn who they are and their identity in the world and environmental responsibilities. If educators turn a cold shoulder and do not reflect on the requirements of today's learner, the significant disconnection and gap between school and the real world will continue to widen. The critical skills that students need to be successful in the 21st century may be categorised into six areas:

1. Students need to be able to solve complex problems in real time (problem solving);
2. Students need to be able to think differently and creatively in both digital and non digital environments to create new and useful solutions (creativity);
3. There is a significant difference between teaching how to learn and teaching content. Often in schools the focus is on content because it is easy to measure. It is very easy to test and assess low-level factual recall. Assessing the low level recall should be considered the minimum starting point and not the end and final goal. So students need to think analytically; comparing, contrasting, evaluating, synthesising in the higher end of Bloom's Digital Taxonomy - figure 5 . (critical thinking and information literacy);
4. Students must have the ability to collaborate seamlessly in both the physical and virtual spaces with both real and virtual partners. (collaboration);
5. Students must be able to communicate but not just with text or speech but in multiple multi-media formats. (communication and media literacy);
6. Students need to act ethically taking personal responsibility, take calculated risks, being resilient, having a global perspective, understanding other cultures, traditions, customs and religions. This category also includes environmental stewardship and acting altruistically. (actions, ethics and accountability).

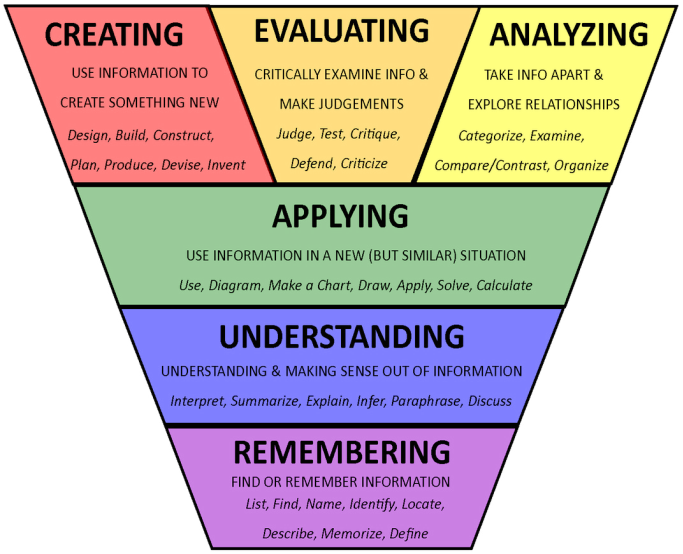

Figure 5. One of many representations of Bloom's taxonomy in the cognitive domain.

These competences can in turn be broken down into processes with measureable steps that lead to creativity, communication, collaboration or critical thinking.

Every single teacher, at every Year, in every subject should take responsibility for 21st Century competences. The implications being that educators need to think more in a cross curricular, multi-disciplinary way about what they are doing in class. It is a major challenge and making a shift to a 21st century learning environment is an uncomfortable place for teachers because it is chaotic and dynamic.

When teachers pose questions and they do not know the outcomes it's an uncomfortable place for teachers. When teachers start to embrace an approach where the students discover their learning, teaching finally becomes more a process about guiding as opposed to leading the process. This may be an uncomfortable process for the teacher at first but it is a very rewarding one as experienced by thousands of teachers world wide who would never go back to traditional teaching.

We need to commit ourselves to change education at classroom level. Just imagine how many children will be impacted over a number of years by just one teacher at a time who makes the shift to 21st century learning. Training and continuous support will help teachers to move from the shallow end of enhancement to venture out of the comfort zone into the deep part of transformation. We need to look at what teaching how to learn and assessment will look like in a 21st century learning environment which in a few words must be relevant, creative and a real world experience.

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