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TITLE Building a digitally ready education system with a bioethical framework - the new normal

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Abstract

This policy brief highlights the timely need to foster digital literacy skills in higher education institutions and provides a model of digital education structured through a bioethical framework. Our reflection is brought forth by the growing pervasiveness of technology within the societal context and the lack of adequate education to tackle present and future challenges. At the same time, we recognize that an essential element of digital education is represented by the ability to critically think about the spectrum of both current and potential harms and benefits of digital technologies. This awareness underlines the very concept of digital literacy as characterized by both practical and thought components. As such, we propose an interdisciplinary model of digital literacy education composed of a basic foundation for digital ethics represented by the set of values characterised in the Universal Declaration on Bioethics and Human Rights, and two categories of digital literacy skills.

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Content

Acronyms

EDL - Ethical Digital Literacy

HEI - Higher Education Institution

ICT - Information Communication Technology

SDG4 - Sustainable Development Goal 4

UDBHR - Universal Declaration on Bioethics and Human Rights

1. Introduction

1. Digital competencies in higher education systems

Focusing on recent trends in the policy agenda for higher education, one can easily trace" an obvious request for a new policy paradigm founded on digital competencies within the framework of the rapid technological progress. In this sense, the COVID-19 pandemic has inevitably propelled education institutions around the globe to engage with a largely new digital educational environment. Compared to primary and secondary education, the digital transition has been met with relatively less obstacles by higher education institutions (HEIs), typically relying more consistently on digital technologies in teaching and learning strategies (e.g. recorded lectures, electronic paper submissions). Nonetheless, the pandemic has highlighted the substantial limitations of HEIs approach to digital literacy, either taken for granted or assumed to be at an adequate level, rather than being evaluated, corrected and upskilled (Coffin Murray and Pérez, 2014).

We believe that the resistance of higher education institutions to incorporate digital literacy as a core, foundational competency, represents a significant obstacle to employability and competitiveness perspectives of future students in a growing digital society (Network Readiness Index, 2021), and to the successful achievement of the 2030 sustainable Agenda. Most importantly, SDG 4 on Quality Education takes on special relevance in its seventh target: empower[ing] learners to take informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations, while respecting cultural diversity."(UNESCO, 2018). The necessity to develop appropriate scientific and educational actions in the context of the 2030 Agenda has also been addressed in the Declaration of Italian UNESCO Chairs for Sustainability, emphasizing the importance of human dignity, common good and health, solidarity and subsidiarity in personal actions and political decisions, in the search for truth, freedom, justice and peace" (Italian UNESCO Chairs, 2021). In fact, parallel to digital skills education, delivering quality education in a growingly digital education ecosystem requires a careful consideration of the inherent social and ethical challenges of technology. Digital systems employed both in educational settings and outside pose a plethora of ethical risks, from online safety and security (identity theft, scams, system phishing, hacking, online predators and cyberbullying), to misuse of information (misinformation, disinformation, and misrepresentation), to health and mental health risks (internet addiction, disengagement with society). In light of these challenges, HEIs must not only equip students with digital skills, but also address how to use these technologies in an ethical, safe, and responsible way without restricting users from fully participating in and contributing to the knowledge society.

1.2 Ethical challenges in building a digitally ready education system

As polarizations still prevail in the access and ability to develop digital skills, so is the digital divide in the relative involvement of individuals in the design and development of technologies (OECD, 2012; Mariën and A. Prodnik, 2014). We maintain that, in an educational environment that is growing digitally, the capacity to understand and be able to make informed decisions on how to utilise digital technologies in everyday life should be highly promoted at higher educational levels (Napal Fraile, Peñalva-Vélez and Mendióroz Lacambra, 2018; Sá and Serpa, 2020). In this context, developing digital competency – or digital literacy – needs to encompass both (1) upskilling and reskilling (including programming, computational skills and competences, and the design and innovation of related ones) (Blikstein, 2013; Iversen, Smith

and Dindler, 2017; Iivari and Kinnula, 2018), while at the same time (2) building ethical leadership in future thinking and critical evaluation of digital systems.

These considerations have provided the present authors with the motivation to develop a new educational model that addresses higher education s digital skills through a bioethical framework. Our model - named Ethical Digital Literacy (EDL) - takes into consideration empirical evidence and theoretical perspectives at the intersection of bioethics and technology, ultimately aiming at providing a significant contribution for the ethical development of a future digital higher education system. The remainder of this paper is structured as follows: the next section describes the subject of digital literacy and the challenges to be addressed. The following, will propose the methods, the framework and the comprehensive bioethics education component whereby digital literacy should be taught. The last section of the paper will present the EDL model in detail, addressing its foundation and structural components.

2. Digital literacy: a transition toward future thinking

In the age of information and communication technologies (ICTs), digital knowledge and skills have become an undeniable driving force behind socioeconomic development and knowledge production. As such, the concept of digital literacy has evolved as a natural extension of the concept of literacy applied to the mastery of digital devices and applications. Consequently, digital literacy education can be defined as the process required to transform the education system of today into the knowledge society of tomorrow. Similarly to other "literacies", digital literacy encompasses basic practical skills required to access and navigate ICTs, comparable to the most fundamental abilities of reading and writing. Nowadays, these fundamental skills[1] are generally well mastered by young adults, more subjected to and embedded within the digital environment, which allows homeostatic learning through daily interactions with the technology. While this certainly provides youth with a head-start in the current digitalised society, their ability to employ information technology to tackle issues and real-world problems is often taken for granted (Razinkina, Zima and Pankova, 2021).

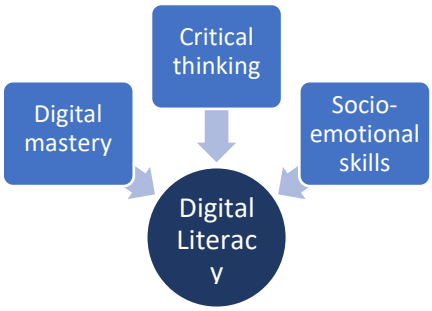
This consideration highlights the broader nature of the concept of digital literacy as going beyond computer literacy and the mastery of practical digital skills. It includes several elements that emphasize the ability to employ technological tools to formulate an argument, solve issues and participate in the development of future technologies as informed individuals. Extant literature has repeatedly addressed the potential of ICT literacy as an essential tool for the maximisation of problem-solving and self-direction skills, as well as mastery of learning and information (Katz and Macklin, 2006). In other words, digital literacy is an essential competency for becoming productive citizens in a knowledge-driven society (Zurkowski, 1974). Further, research findings highlight the significance of digital literacy education on life-long learning. In fact, digital literacy adopted as a broader knowledge paradigm encourages deep, rather than surface learning, proving the individual with the ability to perform independent, self-directed learning once the critical thought digital competencies have been mastered. Without a properly developed digital literacy education, students are at a heightened risk to become target of manipulation, an especially critical issue in view of the rising phenomena of misinformation and disinformation as well as the growing concerns over privacy of data. As such, while policy initiatives aimed at increasing the availability of technologies in HEIs

[1] In general, the relevant importance of ICT competencies is dictated by the very development of technology, but they typically comprise a domain component and a specific knowledge perspective: collaboration, communication, digital literacy, citizenship, problem solving, critical thinking, creativity and productivity (Voogt and Roblin, 2012; Hatlevik, Ottestad and Throndsen, 2015).

represents certainly a first concrete step towards the construction of a digitally ready education system, these will not necessarily translate into digitally literate students. Higher education policies need to focus on transitioning learners competences toward future thinking as they take their place in the future society.

In this sense, we understand digital literacy as more than the ability to use digital sources, but the overall set of cognitive, practical and social-emotional skills allowing individuals to actively and effectively participate in the knowledge society (Ananiadou and Claro, 2009). Our conceptualization of digital literacy mirrors that of Ng (2012) in its three intersecting dimensions of technical, cognitive and social-emotional domains, as well as that of Eshet-Alkalai (2004) in the emphasis put on cognitive and social skills necessary to perform tasks and solve problems in digital environments (Fig. 1). Overall, we present digital literacy as a mind-set aiding individuals to operate naturally in digital settings, as well as to effectively access and use the vast amount of information stored therein.

In the recovery context following the COVID-19 pandemic, we believe that HEIs currently face undoubted challenges, but also opportunities to design and implement effective digital literacy instruction policies. In fact, the transition from emergency-focused remote education to a more stable learning environment should be taken as a valuable opportunity to revise educational institutions level of preparedness and to address the lack of any skills centred around the concept of future digital thinking. At the same time, coherent and effective policy planning should be mindful of digital transformation challenges, and apply lessons from contemporary research to structure a more effective, sustainable and equitable digital education (Thomas, Dasgupta and Martinot, 2007; Thomas and Young, 2011; Coldwell, Joosub



and Papageorgiou, 2012; St. John III and Pearson, 2016; Sellnow and Seeger, 2020).

Figure 1. Conceptualisation of digital literacy

2. Bioethics as a foundational educational framework

The educational model adopted by HEIs is based on the theoretical learning standard known as andragogy, a set of techniques specific for adult education. The foundation of this model relies on the students motivation for learning and their adherence to values acquired throughout personal and academic lives (Fernández, 1994; Morales-González et al., 2018). The values that emerge at the basis of this model are fairly general and include trust, integrity, honesty, equality, justice, respect, fairness, transparency and equity. Further, these are largely aligned to the mission of higher education as a system operating in a transformational and developmental agenda. Yet, as andragogy assumes these core values as already developed and mastered by the student, these are equally taken for granted by higher education institutions. In a context where interest in the digitalisation of higher education is surging, the discourse on

the potential ethical risks associated with the use of digital technologies is high on the agenda. This set of considerations highlights the importance of a bioethical reflection[2] and the present lack thereof.

While often viewed as a niche discipline limited to the area of the biological sciences, bioethics goes much further than the various professional codes of ethics. It entails a pervasive reflection on societal changes and even on global balances brought about by scientific and technological developments (UNESCO, 2005). Most importantly, bioethics is essential for developing critical thinking skills and the development of a dominant knowledge paradigm, instruments that will assist any individual in determining the optimal values, norms, and moral rights to resolve current and future social issues. Certainly, the subject of technology is particularly suited for the application of a bioethical framework, as a rapidly developing field accompanied by equally rapidly evolving ethical challenges in relation to protecting privacy, information ownership and practical applications (McGrath, 2020). In other words, digital technologies are developing at a faster pace than the ability to provide solutions to the ethical challenges posed by this growth. HEIs should therefore seek to employ a bioethical educational framework for the teaching of digital literacy in order to (1) allow students to grasp current subjects of moral and ethical divide and (2) acquire the critical thinking skills to be able to resolve new challenges as they will present with the ongoing development of technology.

Although this gap can be partially filled at a later stage in the educational development by several bottom-up initiatives, corporate guidance or engagement with ongoing policy research, these typically are hindered by the lack of a univocal approach (Mantelero, 2018). Most importantly, the inadequacy of these initiatives rests in their often autonomous and vocational nature, as they remain not integrated as part of an educational curriculum. Further, in cases where they are, ethics and technology are treated as two separate identities. We believe that, in the context of digital education, focusing only on specific technological skills is inadequate and, to a certain extent, even counterproductive. On the other hand, different sets of rights, freedoms and values and their applications to various domains (e.g. healthcare or crime prevention), should be an integral part of the educational strategy. Thus, our model poses focus not only on the technology, but also on the social framework technology exists in. This certainly does not undermine the importance of the various initiatives that take place outside of the educational environment as an essential element for fostering the broader discourse and safeguarding benchmark values. However, adopting a bioethics-oriented digital education allows the discussion to start earlier in the process, and provides young adults with the necessary ethical-digital knowledge to fully participate in the transformation as fully digitally literate citizens.

Against this background, the use of a bioethics lens for the development of educational initiatives has been proven effective in several disciplines, including law (Commission on the Ethics of Scientific Knowledge and Technology, 2003), economics (Martinov-Bennie and Mladenovic, 2015), and engineering (Herkert, 2000; Cao, 2015), where the inclusion of ethics in the curriculum, has been shown to significantly enhance ethical judgement and leadership. With regards to technological education, an ethical framework has been proposed in South Africa following the reconstruction and development of higher education in the post-apartheid era (Engel-Hills, Winberg and Rip, 2019). Importantly, the South African approach attributes central importance to the placement of ethics upfront in the structure of a transformative,

revolution-laden" science and engineering education. Previous research finds the integrated

[2] This critical observation is similar to Ronald Barnett's (2013) concept of "imagining the university", where the need for critical thinking and reflection within the university context is highlighted by the author for the timely adaptation of higher education.

approach of educational bioethics to be the most effective method for the development of students ethical sensitivity and ethical judgment, compared to a stand-alone ethics course (McDonald, 2004; Felton and Sims, 2005; Martinov-Bennie and Mladenovic, 2015). In other words, if students are made into the habit of considering the ethical implications of digital technologies as they are taught their very structure and functioning, then they will more likely transfer this learning to their everyday lives and future careers.

Having addressed both elements of education, the next chapter focuses on the detailed description of the EDL model.

3. The EDL Model

The most straightforward implementation strategy to develop digital literacy in higher education is through curriculum. We believe that for the entire spectrum of digital competencies to be fully mastered by students, three subsequent actions need to be undertaken: (1) make digital tools accessible, (2) acquire digital skills, (3) apply digital knowledge ethically (Figure 1). Actions (b) and (c) are the focus of our educational model.

The EDL model offers multiple application for classroom teaching, providing a simple yet solid structure that links well with problem based and enquiry based learning. Further, the interdisciplinarity and variety of topics in the model are appropriate for self-directed learning and can be used to develop case scenarios and debates. Most importantly, the simplicity of model offers the important opportunity of replicability outside of digital education. In fact, in accordance with Parks (1986), we believe that the primary goal of bioethics as a framework for education is not to teach the difference between right and wrong, but rather to teach students how to incorporate their values into the decision-making process. As such, although the EDL model is focused on the development of digital literacy skills, when adapted it could be applied to many disciplines and contexts.

A diagram of the EDL model is shown in Fig.2. In this diagram the foundation of learning starts with the category of values and moves upward to the development of skills. For organizational and illustrative purposes, we distinguish two sets of skills in the EDL model. However, these distinctions should not be understood as clear cut. While EDL can be broken down into practical and thought skills, as mentioned in the previous paragraph, the best application of the model requires these two categories to merge the boundaries between them. EDL is in fact conceptualised as a dynamic and collaborative process not only between disciplines but also between people. The importance of the participatory element of the model is underlined with the people category and the bidirectional arrows symbolizing the self-nourishing nature of the model through progressive discourse.

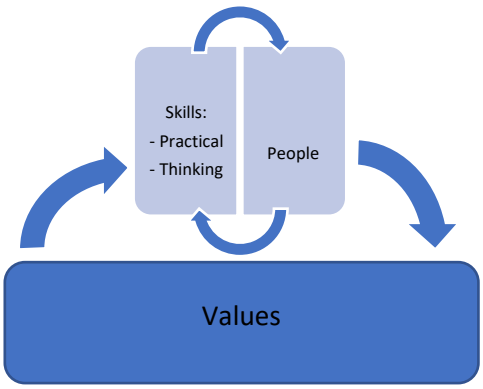


Figure 2. The EDL Model

3.1. Values

Any discussion on the instruments and systems of supervision must necessarily take into account general principles at the basis of these instruments and the means of their implementation. In the context of modern forms of digital technology, identifying foundational principles requires recognizing that ICTs are increasingly interwoven with every basic aspect of human life and identity. Recognizing this relationship then leads one to orient towards a framework encompassing an ethics of life" approach that is rooted in the very relationship between the human and the non-human (Zylinska, 2009). Based on this fundamental framework, values expressed in the Universal Declaration on Bioethics and Human Rights represent the bedrock for the development and teaching of digital education focused on placing people at its centre (European Commission, 2022). The UDBHR displays several advantages to be used as foundational basis for digital education: (1) it possesses international validity, (2) has the status of legal instrument, (3) it has the broadest scope of any other bioethics document, and (4) its principles are simple and general (Andorno, 2007). The UDBHR in fact presents 15 simple but effective principles, which include respect for human dignity, human rights and fundamental freedoms, and the priority of individual interests and welfare over the interests of science and society. At the same time, the generality in the formulation of principles allows a relative degree of freedom of interpretation in relation to terms such as "human dignity", "autonomy", "justice", "benefit", "harm" or "solidarity", which are characterized by significant theoretical background and are influenced by cultural variables to some level. Thus, the UDBHR represents a useful instrument with sufficient fluidity to be adapted in various culturally diverse contexts (as represented by the directional arrow from people to values, illustrating the possibility of the context to influence values).

3.1 Skills

Practical skills

As illustrated in our conceptualization of digital literacy (Fig. 1), the first category of skills necessary to develop a digitally-ready education system is digital mastery. Following the guidelines of the UNESCO working group on Education, the present policy brief identifies three sets of practical digital skills in order of complexity: basic functional digital skills (entry-level functional skills necessary for the elementary use of digital devices and applications, including understanding basic ICT concepts, adjusting settings and managing files), generic digital skills (intermediate skills such as technical fluency in the use of digital devices and software and access of information) and higher level skills (centred on the transformative use of technology and mainly represented by computer programming skills) (UNESCO, 2017). In this context, the EDL model proposes an educational approach based on (1) assessing that basic functional digital skills are mastered, (2) strengthening generic digital skills and (3) develop higher level skills.

Further, as discussed in the previous paragraphs, the EDL model advances an interdisciplinary approach of digital education characterised by the blending of digital and bioethical knowledge. In fact, our model builds on previous national initiatives undertaken in China and South Africa and characterized by the ethics upfront" approach (Wang and Yan, 2019), emphasizing the necessity to cultivate the scientific and technological ethical awareness, so that ethical issues may be addressed "up front" and therefore integrated into the design

process and content of digital literacy education, where they can best serve their function (Cooper et al., 2008). As such, teaching the digital skills described above should be accompanied by relevant education on their potential harms and benefits through a bioethical lens.

Thinking skills

Similarly to the model of digital literacy proposed by Pérez and Murray (2010), the EDL model is founded on an holistic perspective, whereby the construct of digital literacy is expanded beyond the acquisition of fundamental operational techniques and skills. In this sense, the EDL model identifies thinking skills as encompassing both the critical thinking and socio-emotional elements of digital literacy (Fig. 1). In fact, as the primary goal of HEIs is the pursuit and creation of knowledge, we believe that a specific emphasis should be given to the development of critical analysis and evaluation skills in relation to content of information. Before moving to a practical example and the necessary skills that should be fostered, it is important to illustrate the process whereby knowledge is acquired through information. More specifically, this process is characterized by (1) conscious selection of pieces of information, (2) assembly of relevant elements, and (3) creation of relationships between the newly created and the already existing body of knowledge. In this context, digital tools have become essential to access and manage information. At the same time, the growing relevancy of digital technologies has already posed important challenges to knowledge creation, assimilation and distribution, as highlighted by the growingly common phenomena of misinformation, disinformation and misrepresentation. These kinds of information manipulation might be some among the most pervasive harms related to the development and implementation of ICT technologies, with profound significance for the fundamental goal of HEIs of dispersing and creating knowledge.

In this sense, misinformation offers a useful example of the urgency to implement thinking digital skills in HEIs. In fact, like most digital technologies, one of the most difficult aspects in the handling of misinformation is its rapid dissemination, accompanied by the difficulty to implement educational measures correcting the phenomenon as quickly as misinforming materials are generated. As a result, misinformation must be identified immediately and the overall people's readiness to read corrected information must be addressed. To do so, debunking communications with the purpose of correcting disinformation frequently exacerbates the impacts of misinformation. On the other hand, we believe that fostering critical thinking and socio-emotional skills in learners allows the misinformation cycle to be broken. These specific thinking skills should be fostered through various educational activities including, for instance, events on sensibilization and awareness-raising centred on Internet misinformation. Overall, critical thinking skills should reflect the creation of an information culture where people don t hurry up with conclusions, but leave themselves time to search for alternative sources of information.

In this context, policy recommendations for the development of thinking skills reflect the findings from a recent study conducted by Komendantova, Ekenberg, Svahn, et al. (2021) in three countries (Austria, Greece and Sweden) and among three groups of stakeholders (citizen, journalists/factcheckers and policymakers). This participatory approach identified shared measures on digital skills to possibly include: a) greater use of statistics and scientific articles, which are perceived as trusted source of information, b) fostering of personal communication, where people with authority and integrity are involved and could be communicators of correct information, c) publication in trustful sources of information with the following characteristics: neutrality, legal mandate, professional appearance, which includes accurateness of presentation and of writing style.

3.3 People

The EDL model describes a process in which ethical synergy leads to a self-nourishing discourse between individuals, systems and organizations, aimed at the discovery, analysis and resolution of ethical and moral dilemmas in the progressive development and application of digital technologies. A critical step for ethical synergy to be fostered is for different issues to be identified and framed in a way that enables the entire system to work together towards the resolution of practical dilemmas as they arise. To do so, the subject matter over which the discussion is being exercised must be studied and known in detail. However, the boundaries of the knowledge do not need to be precise or fixed. In fact, the diversity of perspectives in any discussion enriches the debate and mobilizes students to build on their personal knowledge while acquiring novel insight and perspective from their wider participation. As such, the people category emphasizes the centrality of student engagement aimed at preventive diagnosis of moral and ethical conflicts for both their individual and societal wellbeing, acting as "prevention sentinels" (Komendantova, 2021). In fact, the people category mirrors the structure of participatory governance as applied to an educational setting (Komendantova, 2021). Participatory governance is closely connected to the issue of conflicts and compromise solutions and thus of critical importance for any ethical discussion. It includes decision-support and decision-making tools that allow stakeholder views and preferences to be understood and compromise solutions to be developed. When applied to higher education, a participatory element will address the power relationships that are inherently embedded in digital tools production and usage, advocates for that power to be balanced between the single user and organizations at various level, and focuses on education aimed at the tackling of situations and practices at the individual, societal and international level. Indeed, any attempt to analyse the ethical repercussion of digital developments, cannot overlook the multitude of perspectives involved in the development and use of technology. All the above mentioned facts reflect the dominant policy rationality at the basis of participation (Hirst & Thompson, 1996; Papadakis & Tsakanika, 2005).

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