Artificial meaning and human computing. A risk-based approach in education of future citizens

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> "The storytelling mind is allergic to uncertainty, randomness, and coincidence. It is addicted to meaning. If the storytelling mind cannot find meaningful patterns in the world, it will try to impose them. In short, the storytelling mind is a factory that churns out true stories when it can, but will manufacture lies when it can't."
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> J. Gottschall, *The Storytelling animals: How Stories make us human*

Abstract
This paper will focus on social and ethical risks about AI misuse. Starting from the difference between human and artificial intelligence, we'll focus on computing and narrative thinking. As human species we produce meanings and symbols and this is related to a complex concept of intelligence. As complex moral agents, we continuously create new situations and knowledges not only based on existing data set. That's why complexity theory and narrative thinking comes together in order to underline the difference from machine learning process. So, a fundamental risk is to flat quality of life on quantity of data, narrative thinking on computation. This is also a risk for pluralism and democracy. One possible way to avoid this risk is Education. On the second paragraph, we'll focus on some ideas about new challenges for educators and students in order to promote AI and Ethics literacy in schools.

Keywords: AI misuse, Human Computing, Artificial Meaning, Education, Future Citizens

1. What comes next: the main scenario about AI

On March 29, 2023, Elon Musk along with 1125 people, signed an open letter asking for a six month-pause about AI development[1].Scientists like Stuart Russell, Yuval Noah Harari, Max Tegmark are among the signatories. If this letter will be approved, we don't really know if a six-month stop will be really respected and if it will be useful.

Until now, European Commission has shown interest in promoting ethical use of AI, emphasizing a human-centered approach since 2018.This sensitivity towards ethics in AI has not been a priority in USA, despite the AI use and definition has always been linked to philosophical questioning, starting from Turing test (RUSSELL, NORVIG 2010).Recently, there has been renewed interest in addressing ethical challenges (e. g. Matthew Kearney from MIT released an interview where he supports a new model "bringing AI and philosophy into dialogue")[2].

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[1] https://futureoflife.org/open-letter/pause-giant-ai-experiments/.
[2] https://news.mit.edu/2023/matthew-kearney-ai-philosophy-dialogue-0310.

New issues have arisen following the release of Chat-GPT-4(e. g. political decision to block its use in Italy). An arms race started among companies in order to produce more powerful AI systems. So, this new economical challenge has underlined an ethical risk that literature about AI has showed us several times. It starts from the differences between a real interest in going into ethical problems and "blue washing" (FLORIDI 2021) as a superficial compliance process.

Not only scientific literature tried to make us aware about AI use and its developments (COECKELBERGH 2020) but also fiction (LEE, QIUFAN 2021). In this paper use of narration will occur in two ways:

i)   In connection with traditional fiction, such as novels, movies and tv-series that depict AI in utopian or dystopian settings and their influence on AI science.

ii)   Linked to Bruner's distinction between paradigmatic thought mode (typically linked to sciences) and narrative mode that «is concerned with the meaning that is ascribed to experiences through stories» (ADLER 2008, p. 423).

The idea is that AI developments empower the vision of a world dominated by mathematical and logical thinking, which is why today there is a push to teach coding in schools. In this sense, there's no space for argumentation, but only for demonstration. This has two consequences:

a)   *Individual consequences*: education could be overbalanced more on computing than narrative thinking, potentially weakening lateral and creative thinking, used to build new meanings, to express different opinion (critical thinking) through argumentation (BONIOLO, VIDALI 2011, pp. 19-25).

b)   *Social consequences*: there is a risk of over-trusting AI, giving it the absolute power in decision-making. This belief in an infallible truth owned by AI that can give us all the right solutions has been called "algorithmic *aletheia*" (SADIN 2020). This poses a threat to pluralism and democracy.

Narrative thinking and democracy are strongly correlated. In a democratic society, everyone can participate with new ideas. While algorithms can optimize processes and provide? A risk-based approach is necessary to uphold fairness and human freedom, leaving everyone a right to disagreement. However, to disagree we need to think differently. In this way, we produce new knowledge and alternative courses of action that make every single person "author" of its own choice (ARENDT 2014). Only in this way we can avoid: (i) the danger of mathematizing ethics- committing our choices to a computational system just because we *believe* it is infallible; (ii) stifling creative by relying on algorithms that perpetuate historical data sets with human biases (O'NEIL 2017). New scenarios, old problems. Elon Musk's "manifesto" reflects deep-rooted ethical questions from our distant past. It cannot serve as a mere temporary solution to ethical issues but rather highlights the ongoing importance of addressing them thoughtfully.

The aim of this paper is to analyze the paradigm of AI in Education (AIED) by comparing computational and narrative thinking and highlighting the importance of focusing on the latter. Throughout history, society has been built upon the autonomy of moral subjects, and development has relied on a dialectic process that allows individuals the freedom of expression through critical thinking. This paper will explore how the emerging computation-based educational model poses a threat to individual development and democracy.

According to other studies (PANCIROLI, RIVOLTELLA 2023), introducing AI and Ethics Literacy in schools for both teachers and students could raise awareness about the opportunities and risks associated with AI. Recently, Ng & al. already focused on conceptualizing AI Literacy, (NG & AL. 2021). Ehsan & al. introduced the idea of the algorithmic "imprint" and its awareness, linked to bias issues, and assuming as background, the Fariness, Accountability, Transparency, and Ethics model (FATE) (EHSAN & AL. 2022). Khosravi et al. share the same perspective, highlighting the FATE model in educational interventions (KHOSRAVI ET AL. 2021). Other studies have focused on the

multidisciplinary approach allowed by AI (TACHTLER ET AL.). We will highlight this topic in the third section of this paper. In an ethical perspective, literature is still focusing on AI computational biases, brain-AI comparisons and conflict about AI and consciousness (VON BRAUN et al, 2021) Educators would then be better equipped to tackle new challenges by fostering a critical approach to AI use and promoting mathematical/computational thinking. Simultaneously, students would learn how to contribute meaningfully to society while preserving their right to dissent, even in the face of the computational model's claim to possess absolute truth. In the next section, we will discuss the differences between computational and narrative/critical thinking. In the third section, we will analyze a potential approach to AI and Ethics Literacy by examining our Ph.D. Project in Italian schools.

2. What has come before: complexity, narration, computation?

In the third episode of the third season of J. JAbraham's TV Series *Fringe*, there is a case where a criminal's mind is increasing his computing skills until he becomes completely unable to communicate. Instead, he starts conversing with computers, which isolates him from his closest relatives and friends.In his world, everything can be calculated, turning him into a dangerous weapon. He is without control and without consciousness, because he simply doesn't think at all, he just computes reality.

This intriguing fictional idea can offer insights into what happens to a mind detached from the human world built on shared meanings and concepts(GIGERENZER 2023). In everyday life, we use meanings to communicate and share ideas with others. The most interesting thing that comes from pedagogical and psychological theories is that we don't only learn meanings, but we learn *how to build* them in our life (BRUNER 1992).We collect experiences, emotions, body signals, and ideas that others have about us to create a self-narrative, shaping our sense of identity and who we aspire to be[3].

Creating oneself through narration is not a simple task. It involves a holistic process that incorporates memory as a complex system(LEVY 2007). Collecting all these pieces (experience, memories, ideas) is not a mere mathematical work (MINKOWSKY 1968).It requires more than addition skills – as a computer could also do, using a binary code as a "thinking" method.

We must address two important issues:

  i) What do we mean when we talk about "thinking" and "intelligence"[4] in humans? It's not a simple question and we cannot provide a complete answer. Nonetheless, AI progress forces us to reexamine the concept of "intelligence". In this paper we will attempt to explore this difference further, but we also need to introduce "complexity".

  ii) the "complexity" paradigm from a holistic perspective. Assuming the idea of a different level of complexity between humans and machines, this could help in reaching an "apophantic idea" of human intelligence in its difference from machine intelligence[5].

Let's start with narration. When we represent the world, we are essentially telling a story (HARARI 2014; GOTTSCHALL 2012). This story combines various elements and layers. The unity of these basic-perceived elements of reality are linked in a way that we define "holistic", because their relation

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[3] That's the relation between actual-Self and ideal-Self. For references: WILSONA. E., ROSS, E. (2003),*The identity of autobiographical memory: Time is on our side*, Memory, 2003, 11(2), pp. 137-149.

[4] We have different definitions of "intelligence" referred to machines in RUSSELL (2020) and one of them is: «Machines are intelligent to the extent that their actions can be expected to achieve their objectives» [p. 9].

[5] This is another relevant topic. We started using"AI" as definition because the first model assumed was the human one. Recently we reversed the process and we're building and idea of human intelligence starting from Artificial Intelligence, that is a computational model. Now, we're adapting ourselves to machines, even changing the environment (FLORIDI 2021; GIGERENZER 2023).

changes person by person. Based on individual life experiences, we decide to put together some elements of reality in order to build our personal meaning of the world and of ourselves using a storytelling strategy. For instance, one person may interpret sorrow as an opportunity for personal growth, while another may view the same situation as a disillusionment with life. This individualization is not solely a matter of personal choice; it depends on multiple factors such as education, family, and genetics. This illustrates that individuals are complex systems interacting with many forces, constructing their own system of symbols which we call their "world."

So, intelligence can be interpreted as a complex system, with many variables at play, and it is our ability to adapt our responses to the world. As mentioned in point (ii), human intelligence exhibits different levels of complexity:

1. The "relative" complexity. It can be divided into a theoretical field and a practical field.
2. The "total" complexity, which combines the two fields from the first level.
3. The "absolute" complexity that involves the first and the second level, but also other features of human species, such as emotions and bodily responses to the environment (DAMASIO 1994).

AI threats this complex idea of intelligence by flattening the absolute complexity into the first level of relative complexity, reducing complexity itself. Pedro Domingo argues that machine learning is the weapon that we use to defeat complexity (DOMINGOS 2020, p. 20). However, true intelligence lies in our ability to manage different variables, adapting our responses to the world, learning day by day and situation by situation.

When we discuss our specific reactions to situations, the concept of meaning becomes more prominent. Complexity and intelligence show us that in reality we have *different* situations and *different* people reacting *differently* to those situations. The number of variables is quite high. This diversity creates chaos, but it also embodies freedom. Each situation is an indeterminate system where no necessity law is working. It is like a quantic field that is determined only when action is taken For instance, when faced with the trolley problem, people's answers vary, reflecting the variability of choices and arguments, each with its own meaning. Some people would kill five people more than one. Other people may not be interested in the dilemma. Other people would decide to kill five people more than killing one. From a theoretical and ethical view, the trolley problem shows a moral dilemma, but from another one, it is indirectly telling something about Aristotle's practical wisdom. Different answers are offering the variability of choices and argumentation - each one with its own meaning.

This leads us to the question "Why do we act how why act?".It is not an easy question and it does not have a unique answer. The fact that we act in different ways means *that we adapt our "Self" representation to a situation.* That "Self" is playing a role because we give it a meaning: good or evil, right or wrong, moral or immoral, selfish or unselfish. All these variables rely on the idea of absolute complexity. When we discover the world and we make a decision, we are not just calculating something (first level of complexity). We are putting together all that we are, all we have been in our life or what we want to be: present, past, future coincide in order to build that story (meaning) of our life.

The question then arises: "Can a machine do that?". Some would immediately say "No", nevertheless, Elon Musk and others are worried about the future of AI. So, we should assume that there is an AI model that can simulate human being. However, the fundamental question remains: Can it simulate "absolute" complexity? Or is it merely another form of Intelligence? Should we consider AI as a sub-symbolic entity?

As previously mentioned, the complexity of human intelligence lies in the creation of meaning and situations through different signals coming from internal beliefs, memories, and external

circumstances. That is why, the Human Information Processing (HIP) model does not align with human intelligence, as we do not solely act morally in situations; we create new conditions and models with increasing facts and knowledge. This highlights the correlation between narrative thinking as freedom.
This introduces two other sub-topics:

    a. Creation enables the birth of new events.
    b. Narration, as a form of creation, is an act of freedom.

Here we have a new relation between narration and creative thinking. If we were to compare our intelligence to that of machines, the key difference lies in the possibility of error and thinking beyond binary logic. This idea has been recently expressed by Julia Treviranus: «Wabi-sabi celebrates the value of the imperfect, impermanent, and incomplete. The imperfect invites participations, the impermanent supports culture change, and the incomplete welcomes a diversification of contributions»(HOLMES, PORAYSKA-POMSTA2023, p. 43).
Looking at the first level of complexity, we find two aspects of freedom: the first leads to new theoretical knowledge, the second to new ethical agency. The main challenge with AI is its adaptivity through learning – something human beings have accomplished during the evolution of species (RUSSELL 2020). However, can AI react creatively without emotions and bodily signals perceiving the external world? That is the AI breakpoint. If AI does not possess the same level of complexity as human beings (i.e., the "absolute" complexity which involves body and emotions), it can only generate new actions and knowledge based on historical data. As a result, AI is confined within a circle of obvious and notable data even, often filled with human biases. In contrast, actions based on primary human emotions and the ability of seeking new solutions to avoid standard processes. We don't merely act or think based on patterns. If that were the case, every action would be predictable, determined solely by past data (BARTOLETTI 2023, p. 82). That is how binary logic works.
The scenario mentioned above arises when we discuss AI as something distinct from human beings. O the contrary, if we assume AI to be as a complex as human being, then there would be no distinction. In this case the question changes, and we would merely be recreating human intelligence. However, we are uncertain about its usefulness or economic sustainability. The role of AI should be to support humans in optimizing their time in a world where every individual is overwhelmed by numerous commitments. Today, with Chat-GPT or Midjourney, we fear that AI might take away our creativity. However, this might not be the real threat. Instead, we should consider these new AI skills as not a replacement for human agency, but as something we are willing to entrust to machines.
This brings us back to the first point "Creation enables the birth of new events". A moral action is an act of creation (ARENDT 1964), especially when we consider Aristotle's model of virtue ethics and the concept of "phronesis" (MCDOWELL 2009). It is not consequentialism or deontology; rather, it is a normative ethical theory focusing on the agent and not just the action. *Phronesis*[6] can be translated as practical wisdom: we know what to do in a given situation, considering the specific context of the action. This means that we are not influenced solely by principles or the calculation of consequences as a computer would be. Instead, we make decisions in the moment of action.Time and space of action coincide, and the situation demands an ethical response that cannot be calculated over an extended period. This is phronesis: the wisest and most practical action decided in a specific moment and space. In situations involving humans, uncertainty is a possibility. While, in a controlled and closed model involving machines, we can only discuss risks and prevent them. A computational model works in a non-absolute complexity situation, where all the variables can be predicted to prevent risks. In

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[6] To understand better the theory of complexity, linked to the idea of Aristotelian *phronesis*, we have previously discussed it in: PISANO, A., (2021), *La macchina e le formedell'azione: deficit fronetico e autonomiaartificiale*, Mechané, 1, *Mimesis Journal.*

contrast, a narrative model operates even in an absolute complexity situation, where uncertainty emerges, and control is required outside fixed patterns (GIGERENZER 2023).

In summary, considering the differences between human and artificial intelligence, we can explore various topics across multiple fields:

1) *Epistemological field*: the theory of complexity and its different levels can help delineate the boundaries between humans and machines.

2) *Psychological field*: a distinction between narrative and computation thinking, linked to the complexity theory in (a).

3) *Ethical field*: a focus on phronesis and uncertain systems, where human actions create new situations and knowledge, expressing freedom.

The focus revolves around a multidisciplinary model, where different approaches come together to avoid risk. One of the most important fields in this regard is education, as it becomes crucial to teach pupils and secondary school students how to work with AI and embrace new challenges in the "onlife" era (FLORIDI 2016).

3. What do we do now? Ethics, AI in Education

One of the most significant applications of AI is in education. This field is highly promising, offering opportunities for personalized learning, data collection, and simplification of educators' work (HOLMES, PORAYSKA-POMSTA 2023). However, it also poses certain educational and social risks. We are witnessing emerging concerns regarding privacy, explainability, social inclusion, bias and discrimination. Additionally, there's the issue of automation bias, which is present within us, just like other biases. We often assume that a machine cannot fail because it works following mathematical patterns and principles. So far, we know that it is not true. We know that algorithms are not neutral. Data fitting is a regular problem of logical fallacy. What some algorithms do is work on pre-existing data and create a false prediction model. These algorithms are just adapted to existing data set. So, the fallacy occurs when the effect (algorithms) comes before the cause (data) (GIGERENZER 2023).

We are persuaded that algorithms are the result of a correct logical thinking, but it always depends on how humans decide to employ them. An ethical perspective on AI is crucial in preserving the symbolic nature and complexity of the world against the mathematization process (TAMBURRINI 2020).

The main concern is that the ethical perspective and awareness about AI is not widespread. Education can help us to make students, as future citizens, aware about AI employment. A lateral question then arises: "Are teachers ready to teach ethical use of AI?"[7]

So, the problem about AI literacy, ethical use and awareness is double, because it concerns (i) teachers and (ii) students. We need more education about AI and ethics in school in order to make all school actors conscious about the new digital era and how to prevent risk in AI use, especially now that we employ it *in* and *for* education (i. e. AIED).

In the case of Italian education, Europe is supporting various countries in updating schools during the digital transition. At the present time, there's not much space for AI and its ethical use. Although coding courses for teachers and students have been introduced in schools, and digital literacy has been integrated, there is still a lack of structural learning about AI and its use.

When we refer to "use", it becomes evident that different ethical issues are emerging. But many teachers are not well-versed in this topic; they are somewhat disconnected from AI's pervasiveness

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[7] «they should also encompass education on digital rights (such as privacy and data protection, as well as freedom of speech and thought), digital communication, digital safety and security, digital identity, and other capabilities that are needed for a holistic picture of AI-systems. For the purpose work is also needed to educate the educators and ensure that teachers are able to address these topics with their students in a critical manner» (Holmes, Porayska-Pomsta, 2023, 135).

in our world. From our Google searches to the time spent on Instagram reels, we are continually being monitored by algorithms. Yet, many individuals are unaware that machine learning and algorithms can change their ideas and lead them into echo chambers (HOLMES, PORAYSKA-POMSTA 2023, p. 162). Perhaps, this is not a problem for adults, but it can be a problem for students. They spend a lot of time on social media watching videos, reels, uploading and downloading data. They spend hours before bedtime on Instagram scrolling reels, while the algorithm is always directing them on the same content. Unconsciously, they are becoming totalitarian ideas supporters or flat-earthers just because they are in a loop created by algorithms. Always on the same content, always on the same pictures, always on the same idea, they don't assume other perspectives about events, people or reality. Algorithm has trapped them and the worst thing is that they are not conscious of being prisoners as the ones in Plato's myth of cave. They are not guilty because they just don't know that there is something else, another possible vision about the same event/person/topic. So, critical thinking is reduced because they are not developing it. This is also a problem for democracy and pluralism (DEWEY 2019).

As stated above, freedom is at risk: (a) firstly, because we are too confident about AI choices demanding machines as they were provided with practical reason and wisdom; (b) secondly, because we are not facing risk through education, leaving future citizens in AI hands.

Students live in a deep level of ignorance. That is why teachers need to learn about the new risks in the digital world and about AI to save critical thinking and individuality.

In order to address this from an educational perspective, we need to work in two fields:

1. The field of competence, supporting a balance between coding and narrative thinking;
2. The field of knowledge, developing AI literacy (e. g. understanding the difference between human and machine intelligence, different species of AI etc. etc.) and incorporating ethical topics in curricula.

The main idea is to include ethics and AI education in Digital Citizenship

We had two different educational missions that helped in working with AI ethics in schools:

1. The first is inside the "Inventio"[8] network. Its main goal is to bring philosophy in all high schools.
2. The second one is with the Ph.D. in Learning Sciences and Technologies. It deals with a research project which includes an experimental stage in 10 High Schools classes.

About this second event we planned a 10-hour lesson per class focusing on different topics:

i) The first phase is a questionnaire for students that will help us in collecting data about AI and ethics awareness in schools.

ii) A second phase (2nd and 3rd hour) will focus about definition of ethics, ethical models (normative and descriptive), ethical categories (accountability, action, autonomy).

iii) A third phase (4th and 5th hour) will concern AI. We will analyze AI typologies (e.g. strong and narrow), algorithm and machine learning.

iv) The fourth phase (6th and 7th hour) is where ethics (second slot) and AI (third slot) will meet. We'll start from a *stimulus* that is the trolley problem as represented in *I, Robot* movie. Then, we will conclude with a simulation of an autonomous vehicle using ideas acquired during the lessons. This section will work by using *Mentimeter* in cooperative Learning.

v) The last phase (8th) we will present a final questionnaire to students about what they have learned about AI and ethics. We are also going to ask them if they are interested in introducing some hours about AI and ethics in school curricula.

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[8]https://www.corriere.it/scuola/secondaria/23_febbraio_22/rete-inventio-porta-filosofia-istituti-tecnici-professionali-baa28c5c-b20e-11ed-8c7f-0f02d700e67e.shtml.

The collected data from the questionnaires will be used for research project results. This is just a model that can help us in introducing AI and ethics in different curricula.

4. Conclusions

The objective of this paper was to discuss the emerging AI risks and opportunities in Education. As discussed in the paper, AI Literacy is to make students aware of the new digital era, and the chance that we must build a critical citizenship. Educational settings, especially schools, are places where we train individuals and future citizens. We must use curricula to link knowledge to reality and helping pupils and students in decision making for everyday life. This means that they have to build responsibility for themselves, the others and the world. They need to build their own narrative about life, not simply entrusting other entities just because the dominant thought tells them that this thinking (computational) is the only one that exists in making good choices.

   We have brought together different research fields to understand and emphasize how AI is an interdisciplinary topic. It also represents a social and ethical emergency, with its main risk being the reduction of quality of life on quantity of life. This often occurs when a mathematical model (computational thinking) is assumed as reliable and all the other forms of thinking (e. g. narrative thinking) are considered as fallible ones. When we refer to quality of life, we are discussing a specific capability that *Homo sapiens* possesses: the ability to create stories and meanings, or a world of symbols. We have learned how to "*sehenals*" (WITTGENSTEIN 2009) as a symbolic species. Humans have constructed a world of symbols upon the environment, which helps us navigate reality. Narrative thinking is slow and requires time. It is not always correct, but it supports evolution. This entails risks, but it is also how we learn and what distinguishes us from machines as a holistic system of absolute complexity. Therefore, education is one of the ways that could help us prevent risks and care for individuality, pluralism, and democracy. We must avoid prejudging ethics as something that hinders progress, but rather view it as something that helps us use AI wisely. This is our responsibility to nature and to humans. Future directions of the research could address teachers training about ethics and AI (KÖBIS, MEHNER 2022), not only about contents but also about methodologies.

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