Journal of Inclusive Methodology and Technology in Learning and Teaching
ISSN 2785-5104
Anno 5 n.3 (2025)

EDIZIONI UNIVERSITARIE ROMANE
editoria scientifica dal 1952

Technological artifact, the development of an automated and conscious process. Artificial Intelligence and positive learning.

Angelo Cappello [1]

[1] Università degli Studi di Messina; angcappello@unime.it

Abstract: The universe we are part of, amidst ongoing social models and evolutionary processes, moves its actions inexorably driven by the need not to be left behind and by the inherent human desire for discovery and innovation. Today's social environment is fueled by technological functions and devices, restructuring and shaping social participation processes according to shared and easily assimilated characteristics. Human nature, supported by processes of knowledge and motivated curiosity, has developed those cognitive articulations and extensions that have imbued it with new educational models, built on the supporting structure of human-machine relationships and their correct use, for effective and positive learning. In this scenario, Artificial Intelligence fits in, a technological device born with the aim of supporting, through its extensions, humanity and society as a whole in their daily activities.

The ability of technological tools to interact with humans demonstrates how the construction of the real world depends on identifying the necessary measures to ensure the satisfaction of both individual and collective needs. Technological articulations, whether induced or deduced, represent those levels of multiple associations capable of responding, if properly structured, to external inferences and social needs. We are, therefore, dealing with receptive devices that process an infinite amount of data to provide comprehensive responses to every single request from the environment. Furthermore, the ability to create predictions, a uniquely human characteristic, to analyze and decode data upon data, allows the machine to calibrate feedback responses to stimuli based on previous experience on previously analyzed data for effective and satisfying interaction.

Keywords: Artificial Intelligence; machine learning; technological knowledge; Generative AI; technological artifact.

Copyright: © 2025 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (https://creativecommons.org/licenses/by/4.0/).

1. Introduction

Access to knowledge today requires a transposition of all those inferences that evolve with changing social dynamics. The concept of social extension is now transformed into human extensions that represent and structure socio-environmental re-

lationships. Today's identity, powered by an exponential development inherent in human essence, shaped and strengthened by infinite synergistic structures of knowledge creation, is strengthened by all the inferences that regulate natural social development. This knowledge is nourished by automatic mechanisms, digital associations, and technological devices that act as human prostheses.

In this complex yet fascinating system, the vast sea of Artificial Intelligence moves, a constantly evolving and fascinating field that is establishing itself over time as a tool to support actions aimed at humanity and society. This doesn't mean that, in the short or long term, it will replace the natural alchemy built over years of human relationships, but it will provide new tools for observing and managing environmental inferences in a different light, a vision based on perspective and positive action by and for society.

2. Technological knowledge, the identification process of artificial intelligence

When we speak of revolution, whether it concerns historical events of local or global significance, or whether we are discussing actions aimed at the heterogeneous development of various areas, sectors, and communities simultaneously oriented towards social well-being and the satisfaction of daily needs, we must draw on concrete actions and processes that underlie a social revolution. A society that has always assimilated, carefully observing the phenomena that revolutionized it, changing the fate of the peoples it accepted and incorporated all its positive aspects, the way of relating to one another, and the process of decoding observable phenomena. When we talk about Artificial Intelligence, we must not overlook what history has created for it. Starting from the first studies on Artificial Intelligence, we cannot fail to highlight the countless definitions and arguments regarding this field of great national and international interest.

In this regard, scholars Russel & Norvig (2020) have shown how all of them are appropriately associated with a very specific process of conscious and positive processing. The concept shifts towards identifying a more coherent and correct meaning of "intelligence". It was highlighted that a correct definition of the meaning of this terminology should focus on the coherence constituted by human performance. Others, going against the grain, have followed the concept of rationality, according to a decision-making process, which leads to the most correct solution to be taken with respect to the information made available. The key concept, despite the divergences, was represented by the idea of intelligence expressible through non-verbal language and therefore through behavior as a consequence of a specific stimulus. According to

the same authors, therefore, expressing the concept of intelligence within the AI universe means evaluating a relational process that can be divided into four sections:

- ✓ Rational and human;
- ✓ Thought and behavior.

The positive interdependence between them creates a well-defined and distinct structure, integrated and in continuous relational contact for a shared and integrated process of knowledge. From these first two characteristics, we moved on to construct a framework that best encompasses and explains the symbiotic relationship between humans and technology, between virtual representation and rational representation of environmental feedback. Exemplifying these concepts, the subdivision made by Russell & Norvig offers this illustrative yet concrete and comprehensive framework:

- ✓ Acting rationally;
- ✓ Thinking rationally;
- ✓ Acting like a human;
- ✓ Thinking like a human.

The underlying idea remains one of indefiniteness and certainty, lacking a single definition accepted by nearly all scholars in the field, precisely to underscore the multifaceted nature of a sector that encompasses diverse yet complementary thematic areas. In constructing an idea that can be traced back to the concept of AI (Stradella, 2023), in everyday life and in the management of actions aimed at the contextual well-being of a society engulfed by the pressure of continuous and constant revolution over time, AI is at the center of a process of total change and innovation. In this scenario, the research sector enables us to provide a comprehensive picture of a process of social recognition of the influence of technological tools.

The suggestions that have arisen over time have led to new and fascinating perspectives, supported by nodal systems of shared knowledge, epistemic relationships, and meaningful content analysis. In 2018, Van Kraay T. (2018), through the publication of some, and in particular one, advances his ideas by trying to provide an explanation that is closer and more acceptable to the vast majority of scholars, distancing himself from previous ones, by providing a definition of Artificial Intelligence. "Artificial Intelligence is the ability of a computer system to deal with ambiguity, by making predictions using previously gathered data, and learning from errors in those predictions in order to generate never-before-seen, more accurate predictions about how to behave in the future".

He goes on to define, countercurrently, how the concept encompassing AI exemplifies a differentiation between obsolete and outdated systems and current ones, at-

tentive to social issues and the needs of individuals. The author argues that the potential of this technological tool lies in its ability to manage situations that are not entirely transparent and ambiguous, accurately understanding the management organization of processes that lead to forecasting based on real-life situations.

3. Concrete applications: fields of application and technological functions

Nowadays, the process that has brought AI devices into our lives (Cristianini, 2024) is so integral to our daily lives that we're completely unaware of it. We exploit it in so many areas of our daily activities that we consider them as apparatuses and extensions of ourselves, from which we cannot dissociate ourselves, much less distance ourselves. One of the fundamental aspects of AI is its ability to adapt to different sectors, thanks to a versatility that allows it to be adapted to different fields, both professional and otherwise. The multifaceted nature of this tool allows it to capture the characterizing elements in the information acquired from the environment through a process of analyzing patterns and similarities between the various data analyzed.

All these meaningful decoding agents strengthen the broad range of possibilities for positive and effective information recognition. The hyper-personalization of content delivery methods (Andler, D., 2024) allows AI devices to shape knowledge sharing methods, adapting them to individual specificities. This creates data analysis systems that focus on the congruence between contextual relationships and individual analyses, for a process of adapting and shaping feedback. This personalization promotes a technology-supported learning process, which focuses on personal enrichment and the development of potential in a positive interdependence of shared knowledge.

Focusing on the fundamental characteristics of how everything revolving around AI is exploited to satisfy individual and social interests, what must be highlighted is AI's ability to help humans make the right decisions, thanks to predictive functions and effective support for human decision-making. This technological expansion, created by algorithmic systems for decoding data and their relationships, can assist humans in their analytical functions and in the various phases of the decision-making process. In fact, it:

It helps direct the problem towards an effective course of action, allocating resources in a structured way to discover the most suitable ways to achieve the objective;

✓ It enables better data management and visualization by correctly identifying the relationships between them, providing positive support and explaining why certain events and results occurred;

✓ It adapts and improves the understanding of past performance, contextualizing past actions and monitoring ongoing actions;

✓ Synthesize and estimate unknown outcomes, anticipating future actions arising from pre-existing relationships.

This examination leads us to consider several aspects of making complex, replicable, objective, and instantaneous decisions, confronting us with:

✓ Complexity due to the large amount of data analyzed by the system, an interpretation that analyzes the countless nuances with which we give weight to acquired knowledge, or because the complexity of the data is too great to allow for linear and positive decoding;

✓ Replicability leads to a scalar construction of environmental inferences, for increased personal experience;

✓ Objectivity, which guarantees accountability for the decision-making process;

✓ An instantaneous response to the occurrence of certain environmental stimuli.

In this complex phase, the natural functionality of AI devices is composed of several aspects that characterize their organizational scopes and boundaries. While the key to meaningful decoding procedures lies in a continuous automation process, we cannot help but focus on inferential systems regarding the type of language used by AI to analyze infinite amounts of data. Natural language processing (NLP) processes and decodes, through algorithmic strings, all external data to analyze, classify, and understand natural language, which is used spontaneously by humans for interactions between parties, systems, and individuals within a sociocultural ecosystem. Specifically, NLP is a field that unifies linguistics with computer science as a prerequisite for a systemic structure of technical sections, thanks to which the nature of any message conveyed in context is revealed. However, the contextual linguistic context that surrounds humans can often be ambiguous, precisely because of the subjective and personified nature of the communicative relationship.

The tool's ability to operate on differentiated yet interdependent levels (Kissinger et al., 2023) shapes actions aimed at achieving objectives, adapting both physical and technological resources toward that expected and achievable goal. The multifaceted nature of AI, adaptable to contextual inferences, paves the way for an innovative and tailored vision of relational processes and their influences within the context. The world is changing, and with it, our interactions, our way of acting and reacting to the countless external feedback loops, are evolving in accordance with the change necessary for the structural evolution of society itself.

4. Machine Learning and Deep Learning, Generative AI for Profitable Learning

Although AI is often associated with cutting-edge, high-prospect technological contexts, before delving into the natural implications of automated key devices on society, we need to first address some fundamental characteristics that underpin the functioning of these devices. And at this point, we cannot fail to focus on current generative AI (Holmes & Miao, 2023), now called Gen AI. It represents a type of AI capable of analyzing infinitesimal amounts of data, creating original content—text, images, videos, and more—that can respond promptly to user prompts or requests.

Generative AI is self-managed thanks to sophisticated machine learning systems and deep learning models integrated into machine learning (Baidoo-Anu et al., 2024), which are nothing more than algorithmic structures that simulate and faithfully reproduce human learning processes and correlate with human decision-making. These systems are structured by encoding and analyzing social inference models capable of managing large amounts of data, building solution paths that leverage knowledge already acquired over time. This creates innovative interactions that integrate virtual representation systems with real-world representation models, ensuring efficient and satisfying user interaction.

Generative AI, by offering various insights into the final solution, develops advantages in terms of the production process, both for institutions and individuals. The ability to analyze infinite amounts of data, while marginalizing that which is necessary to meet social needs, represents a fundamental function that propels AI and its branches toward a path of social adaptation. But what are the elements necessary for generative AI to function optimally? From this point on, it operates in three distinct phases:

✓ Training to create foundation models that can be used for many generative AI applications;

✓ Fine-tuning to adapt the foundation models to a specific generative AI application;

✓ Generation, analysis, evaluation, verification, and fine-tuning, to calibrate the outputs of generative AI applications, continually improving their accuracy and quality of responses.

Generative AI rests on those foundation model fields that allow it to build upon pre-existing relationships and actions, through a reiterated process of functions for the necessary development of structures, such as large-scale linguistic models (LLMs). Drawing on these open technological management systems for knowledge construction, generative AI thrives on actions that originate from a positive interdependence

between technological systems and human traits. The significant developments of recent years have also led AI to become the central hub of a growing area of active intersections inherent to the verification of a positive and adaptive learning process.

The foundation model is structured around an algorithmic training activity based on a deep learning model involving a huge volume of raw, unlabeled, and unstructured data. While training, the algorithm analyzes, evaluates, and executes an infinite number of gap-filling exercises, attempting to predict the next character in a sequence—for example, the next element in an image, the next command in a line of code, or the next word in a sentence—organizing itself to minimize the gap between the prediction of a given event and the actual data about it (correct result). The core of this training is based on a neural network of parameters and functions, encoded representations of entities, capable of generating content-based output in response to the feedback received.

Giving specific weight to the great work underlying AI, and the great work it creates for society, is Machine Learning (Serrano, L., 2024), one of the most important and fundamental subsystems of AI. A term first coined in 1959 by scientist Arthur Samuel, it perfectly identifies the ability of machines to learn, acquire knowledge, and exploit it to generate outputs in response to environmental stimuli and perform tasks for which no basic programming has been performed. Rather than using a traditional method, which specifies all the steps to follow to achieve a specific objective, these algorithmic software programs have the ability to learn from previously analyzed information, thanks to the processing of a huge amount of filtered and decoded data.

The fundamental characteristics of machine learning frameworks can be described as follows:

✓ Algorithmic framework, i.e., a set of rules and procedures that enable the recognition of recurring structures and patterns in data analysis using various systematic methods;

✓ An input dataset, the starting point on which the algorithm works and structures itself to provide awareness and effective responses to the surrounding environment;

✓ A final model, the result of algorithmic data processing that describes a real-world context analyzed using appropriate parameters.

If the resulting result (the model) is not precise or accurate, the quality of the results can be improved by analyzing additional data to refine the response, making it more relevant to the company's needs. Currently, there are various types of machine learning, grouped into four distinct categories. The first type of ML is supervised learning, an approach that is similar to human functions, based on experiential and meaningful learning. Pre-labeled data is used, associating each input with the corre-

sponding output, allowing the algorithm to learn from existing relationships and the rules underlying the model. The process itself follows several key steps, the first of which is the data labeling procedure based on the inputs received, assigning them the correct output. Currently, the human-supervised model is fed unknown input data to the test dataset and compared with the expected outputs.

Deep Learning is a key aspect of these data analysis frameworks, resulting in knowledge acquisition for optimizing solutions to ensure the effectiveness, efficiency, and satisfaction of the company that uses it. Defined as deep learning, it is a subcategory of machine learning, representing its most sophisticated form. The distinctive feature of DL is that, unlike other machine learning frameworks, it leverages artificial neural networks (ANNs). These are primarily mathematical and computer science computational models, supported by interconnected domains and nodes, based on the functioning of biological neural networks. These are adaptive systems, capable of modifying and adapting to the inferences received and restructuring themselves internally.

For deep learning to be fully capable of managing and organizing the vast amount of data being acquired and analyzed, it must operate on three distinct levels of artificial neural networks that analyze the data and combine it with previously processed data. In short, we can describe these three levels according to a structured scale that highlights their defining characteristics.

5. Educational Process and Artificial Intelligence: A Powerful and Positive Combination

The adoption of technological tools designed to strengthen and serve as a valuable ally in human decision-making requires a solid strategy that considers change management and the resulting influence it generates. This change is driven by the constant human need for innovation, seeking outcomes that will lead society to evolve while always keeping in mind individual and collective needs. If, at the same time, we consider society's path to embracing and best managing this change, we note that sustained efforts have been directed toward achieving the perfect adaptation path to these new developments.

The convergence of three key factors (Zuccarelli & Di Matteo, 2024), designed to generate highly resolvable feedback and shaped by social models of meaningful decoding—hardware, software, and the connectivity network that connects and shares knowledge—has given rise to a multifaceted, versatile, and potentially effective technological ecosystem. The educational context has thus been swept up in a constantly evolving process that has overlooked nothing and, in shaping this transfor-

mation, has also considered the less visible, more complex factors that shape the construction of reality.

The digital world (Fabiano, 2022), and Artificial Intelligence in particular, pursues its goals by riding the wave of the hypermedia revolution, which places society, humanity, and its personalities at the center of the innovation process. These consistencies arise from a continuous interaction with the world that builds its foundations and supports the weight of an active revolution in the management and creation of knowledge.

The foundations upon which AI is built (Kazimzade et al., 2022) have nourished and accompanied society, amidst difficulties and hopes, towards that change, that revolution that is redefining the boundaries of operations and actions possible in every social sector. The operational core of AI is based on countless algorithmic functions capable of generating and acquiring information, generating data by identifying patterns that underlie the decisions the device analyzes based on the feedback received. The prudent use of these algorithmic processes, transparency and confidentiality, along with the protection of personal data, combined with a formula that mitigates possible biases, become key elements for the effective programming of these innovative devices and the implementation of truly revolutionary and satisfying solutions.

The cornerstone of generative AI are all those sophisticated algorithms that focus their work on the ability to learn data and the ability, in a short time, to make precise decisions based on contextual stimuli received much more quickly than humans. But, what are the elements that really tip the balance towards systems that benefit educational organizations and make these technologies fundamental to a profitable learning process? According to Floridi (2023), some essential characteristics can be highlighted that make AI an extension of human functions and a diverger of all the variables brought into play, from cognitive to emotional ones, which turns its gaze towards a technological society that takes into account the beneficial effects that machines can bring to the activities carried out by humans in the course of daily life. It is therefore possible to briefly highlight the preeminent and functional aspects:

Intelligent automation process: AI enables the creation of complex processes and the repetition of tasks that relieve individuals of unnecessary and superficial workloads, allowing them to focus on functions that require higher-value processes;

Personalization of experiential scales: procedures for analyzing personal interests and needs create fertile ground for personalizing experiences that facilitate positive learning based on a person's unique characteristics;

Development of data-driven decision-making systems: the ability to examine and process infinite amounts of information in real time provides the information needed for strategic decision-making;

Improvement of operational and structural efficiency: in the education sector, this aspect allows for the optimization of educational practices, leading them to improve the quality of the artifacts produced by contextual relationships, maintaining effectiveness through the reduction of stressors and the optimization of personal resources;

Innovation in human services and in the products provided: AI itself is giving life to a new generation of products that can be defined as "intelligent," which are dressing and shaping the dynamic corpus that encompasses the surrounding environment, transforming not only the education sector but also all the other sectors that contribute to building social identity.

The analysis and coexistence, within the device, of infinite quantities of data that substantiate the cognitive apparatus of the world around us requires the design of strategies that use Big Data (Yang et al., 2021), structured around several key points that provide an understanding of the elements necessary for a successful outcome and the fulfillment and satisfaction of the established objectives:

Defining clear guidelines and objectives for analyzing the questions to which concrete answers are sought and the potential problems to be solved;

Structuring, through significant investments, the technological infrastructures that must guarantee a repository (electronic warehouse) thanks to the archiving, processing, and analysis of large quantities of data that constantly interact with feedback from the environment;

Placing data quality management at the center of the process to minimize errors while ensuring data integrity and validity;

Promote a technological society because the future is created thanks to approaches that are built and evolve for and with the data transmitted through technology.

6. Conclusions

If we consider how the technological universe unfolds and changes based on the cultural challenges it faces, and in this scenario, responsible use becomes essential for the creation of artifacts that do not distort the objectives they foster. New tools for machine learning, generative AI, and that ever-evolving dialogue open up new and interesting yet still entirely untapped scenarios. The technological fields of reference for AI represent everything that can be envisioned as a convergent soul between everything that constituted the humanities and sciences in the past. This univocal position will tip the balance in the direction that will lead us to a realignment of social functions, capable of regulating the actions performed through technological devices. Functions created to pursue and satisfy solutions aimed at social well-being, capable of concretely offering adaptable and functional products. In a positive vision of the future, it is essential to look around and hope that the educational innovation of AI

devices will leave a tangible mark and support a new general culture, one built on the deepest human values.

References

Andler D., *Il duplice enigma. Intelligenza artificiale ei intelligenza umana*, Editore Einaudi, Milano, 2024

Baidoo-Anu D. – Ansah L.O. (2024), *Education in the era of generative artificial intelliugence (AI): Understandingthe potential benefits of Chat GPT in promoting teachingand learning*, in journal of AI, VII (1)

Cuomo S., Ranieri M., Biagini G., (2024), *Scuola e Intelligenza Artificiale. Percorsi di alfabetizzazione critica*, Carocci Editore, Roma

Cristianini N., (2024), *Machina Sapiens. L'algoritmo che ci ha rubato il segreto della conoscenza,* Il Mulino, Milan

Fabiano A., (2022) Ipotesi per una migliore giustizia sociale. La scuola inclusiva tra didattica digitale e intelligenza artificiale. Hypothesis for better social justice. The inclusive school between digital teaching and artificial intelligence. Formazione e Insegnamento, pp. 116- 126

Floridi L. Durante M., Etica dell'intelligenza artificiale. Sviluppi, opportunità, sfide, Raffaello Cortina Editore, Milano, 2023

Holmes W., & Miao F., (2023), Guidance for generative AI in education and research. UNESCO Publishing

McCharty J., (2007), What is Artificial Intelligence? Stanford University, Stanford

Nilsson N. J., The quest for Artifical Intelligence: a History of ideas and Achiements, Cambridge University Press, Cambridge

Kazimzade G., Patzer Y., & Pinkwart N., (2022), Artificial Intelligence in Education meets inclusive educational technology. The technical state of art and possible diections. "Artificial Intelligence and inclusive education: Speculative futures and emerging practices, pp. 61-73

Kaplan A., Haenlein M., (2019) Siri Siri in my hand: Who's the fairest in the land? On the interpretation, illustrations, and implication of artificial intelligence" Business Horizon,

Winston P., (1992), Artificial Intelligence, Addison-Wesley, Reading

Kissinger H., Huttenlocher D. Schmidt E., (2023), L'era dell'intelligenza artificiale. Il futuro dell'identità umana, Mondadori, Milano

Roncaglia, Gino, L'architetto e l'oracolo. Forme Digitali del sapere da Wikipedia a ChatGPT, LaTerza, Milano, 2023

Russell & Norvig, (2020), Artificial Intelligence: a Modern Approach, 4th ed., Pearson, Hoboken

Samula A., (1959), Some Studies in Machine Learning Using the Game of Checkers, IBM Journal of Research and Development, 3, pp. 210-229.

Serrano L. G., (2024), Machine Learning spiegato in modo semplice. Guida illustrata per programmatori curiosi, Apogeo, Milano

Stradella E., (2023), Stereotipi e discriminazione: dall'intelligenza umana all'intelligenza artificiale. Consulta Online, (Liber Amicorum per Pasquale Costanza), pp. 1-10

Sutton R. S., & Burton A. G., (2018), Reinforcment Learning: An introduction, 2nd ed. MIT Press, Cambridge

Yang, SA., J., H., Ogata H., Matsui, T., & Chen N., S., (2021), Human-centered artificial intelligence in education: the invisible through the visible. Computers and Education: Artificial Intelligence, 2(1) 01-05, http://doi.org/10.1016/j.caceai.2021.100008.

Zanon F., Pascoletti S., & Di Barbora E., (2022), L'Intelligenza generativa per l'azione didattica dell'insegnante inclusivo. L'esperienza di una progettazione inclusiva nel Laboratorio di Tecnologie Didattiche del corso di Laurea in Scienze della Formazione Primaria. Italian Journal of Special Education for Inclusion, 12(1), 090-097

Zuccarelli, E., Di Matteo G., (2024), Intelligenza Artificiale. Come usarla a favore dell'umanità. Mondadori Electa, Milano