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Education as Hermeneutic Study: Uncovering Meaning in The Digital Era

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ABSTRACT

This objective study explores the role and challenges of hermeneutics in education in the modern digital era. This type of research uses a systematic literature review approach to studies published between 2017 and 2024. This article uses strict criteria for what to include and what to leave out to look at the main trends in how hermeneutics is being used in social media, AI, and big data. It also talks about the ethical and philosophical problems that come up. These main results show that using hermeneutics in education in the digital age can help students understand texts better, but it can also cause problems with ethics, meaning, and how to represent different cultures. Additionally, in hermeneutics, interpretation constitutes the essence of comprehension. This perspective is appropriate for educators, as their responsibility is to comprehend human behavior and creations and subsequently impart this understanding to students in the learning process. The results of this SLR show how important it is to use a more integrated hermeneutical approach to deal with the problems and opportunities of using digital technologies in education. They also recommend further research on developing flexible and situation-relevant interpretation methods to promote a more balanced relationship between education, technology,

and society.

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Education as Hermeneutic Study: Uncovering Meaning in The Digital Era

1. Introduction

Hermeneutics, as a branch of philosophy concerned with the art of interpretation, has evolved significantly with the advent of digital technology (Zovko, 2023). Hermeneutics now encompasses not only the analysis of written texts but also digital data, artificial intelligence, and social media in this context (Morán-Reyes, 2022). This transformation is important because the way we interpret and make sense of data in the digital age has far-reaching consequences in cultural, social, and political contexts. Several studies, such as those by Henrickson and Meroño-Peñuela (2022), highlight that the rapid development of technology often neglects crucial aspects of meaning and contextualization. Therefore, it is important to explore the application of digital hermeneutics in addressing the challenges of interpretation in the modern world (MacLeod et al., 2023; Sackstein et al., 2023). Research on digital hermeneutics also highlights issues of ethics and social responsibility in the development of technologies such as artificial intelligence. Janssen et al. (2022) notes that the algorithms used in AI often reflect the cultural and political biases of their creators, which can impact the decisions made by the AI. These challenges make hermeneutics an important tool for evaluating and interpreting AI systems in a fair and ethical manner. However, the lack of research on hermeneutics' role in fostering more ethical and contextual AI highlights a research gap that requires filling.

Furthermore, the need to extract useful information from large volumes of data often drives interpretation and analysis in the context of big data. Pääkkönen & Ylikoski (2021); Morán-Reyes (2022) emphasized that without a proper hermeneutical approach, big data can lose its contextualization, becoming merely statistical patterns without deeper meaning. Gill (2017); Hassani et al. (2020) reinforced this by showing how a hermeneutical approach can enrich big data analysis by providing cultural and social context to the patterns found.

In the digital age, hermeneutics plays a vital role in understanding the complexity of meaning generated by modern technologies, such as artificial intelligence (AI), social media algorithms, and big data (Romele, 2019; Carter et al., 2020). Hermeneutics, as the art and science of interpretation, serves to bridge the gap in understanding between humans and automated systems, especially in the context of machine-generated text (Henrickson & Meroño-Peñuela, 2022). In AI and big data, hermeneutics helps ensure that data is not just statistics but also has contextual meaning by considering social and cultural dimensions. In addition, hermeneutics provides an ethical approach to technological development, with Lee (2018);

Ferrara (2023) highlighting the importance of the value of fairness in AI algorithms to reduce bias and increase public trust. Fuenmayor & Benz Müller (2018) reinforces this view by showing how hermeneutics can help AI better understand the social context of users, thereby reducing misunderstandings in human-machine interactions. Andersen (2020) notes that algorithms determining content in social media often shape public perception, creating an interpretive space that requires deeper study through a hermeneutical approach to mitigate the effects of algorithmic bias.

However, when applying a cross-disciplinary approach, hermeneutical approaches in digital humanities and the semantic web suggest that users can interpret digital data more relevantly (Krämer, 2023). This approach is relevant to creating an interpretive model that is not only data-based but also considers human elements, such as cultural values and social preferences. Cultural perspectives and social values heavily influence visual interpretation in a digital context, where hermeneutics enriches the understanding of images and visual content (Poulsgaard & Malafouris, 2023).

Furthermore, hermeneutics helps bridge the interpretive gap between technology developers and end users. Iivari (2018) highlights that hermeneutics enables developers to better manage the differences in meaning intended by developers and users' perceptions through reflection and context. Thus, digital hermeneutics becomes relevant in creating a deeper understanding in the technological era, where interpretation can adapt to user needs without losing its original meaning (Grunwald, 2020).

Thus, this study underlines the potential of hermeneutics in overcoming the challenges of interpretation in the digital world. Various studies have shown that hermeneutics not only plays a role in technical aspects but also in building more adaptive, ethical, and contextual systems in various digital interactions.

Digital hermeneutics contributes to big data analysis, enabling the understanding of complex and massive data not only as statistical patterns but also enriched with relevant social and cultural contexts (Daquino et al., 2020). Without a contextual interpretative approach, Adadi (2021) observe that big data often loses its deep meaning and becomes limited to the results of numerical analysis. A hermeneutical approach allows for a more comprehensive analysis of patterns in big data, considering the cultural background, community needs, and social perceptions that underlie the data. The modern world heavily relies on the collection and utilization of big data for decision-making, making this approach crucial.

In addition, hermeneutics in the context of social media has a significant impact on how we understand public perception and social interactions. Wellner (2023) highlights that social

media algorithm, which determine the content that users see, create “filter bubbles” and “echo chambers” that risk reinforcing certain biases and isolating users from alternative views. Hermeneutics helps explore how these algorithms shape narratives, which in turn influence public opinion and reinforce beliefs that may be biased or distorted. With a hermeneutical approach, we can examine the ethical impact of these algorithms and develop strategies to create more open and inclusive interactions in the digital world.

The application of hermeneutics to the Semantic Web and the Internet of Things (IoT) is increasingly relevant in answering the challenges of interpreting digital data involving various devices and applications. Andersen (2020) shows that hermeneutics can play a role in making data on the Semantic Web more human by considering the specific context of the user. In IoT, where data generated by various connected devices is increasingly complex, hermeneutics allows for the management and interpretation of data that is not only technical but also meaningful to users, thus supporting more personal and contextual interactions.

These studies show that digital hermeneutics can provide guidance that not only focuses on technical understanding but also considers the human aspect of interpreting digital meaning. Hermeneutical studies are essential in the digital world to build technological systems that can adapt to dynamic social and cultural contexts while improving the quality of interactions between humans and technology (Sackstein et al., 2023; Zovko, 2023). We expect hermeneutics to continue developing in this field, providing a rich and diverse interpretative foundation that supports the creation of a more inclusive, transparent, and ethical digital system.

In its current form, education is a social construct that involves specific activities carried out by its participants to achieve defined objectives (Anastasiou & Kauffman, 2017). All facets of education, encompassing the institution's vision, goal, and objectives; curriculum; and pedagogical practices, represent a corpus of texts or discourses susceptible to varied interpretations. Education serves as a rich domain for the implementation of hermeneutics, encompassing technique, philosophy, and critique (McPherson, 2021).

Educational institutions serve as both a method and a repository for the creation of interpretations, as they standardize the discourse in the text (Mitter & Brissett, 2017). Like its influence on textual analysis, interpretation shapes the vision, mission, objectives, curriculum, and learning processes of educational institutions. Moreover, curriculum development presently utilizes competencies as a reference, which entails an interpretative process (Dilekçi & Karatay, 2023). Formulating a competency fundamentally entails interpreting abilities or skills to satisfy external needs across multiple domains. Teachers developing skills are analogous to hermeneutics, who strive to elucidate how competencies correspond with actual needs and

requirements in the sector (Hodge et al., 2020).

To highlight the interconnection between education and hermeneutics, we can examine the variety of educational institutions throughout Indonesia's history, including Islamic boarding schools, formal schools, madrasas, and other non-formal entities (Jensen et al., 2022; Kloeg, 2023). The influence of interpretation is the sole explanation for this phenomenon. Ideological, economic, and political variables persist in influencing this interpretation, leading to relatively divergent visions, objectives, goals, and curricula, even when the institutions themselves remain unchanged. Currently, we frequently encounter schools that vary in their visions, missions, and objectives. This also pertains to Islamic boarding schools, madrasas, and universities.

The purpose of this SLR is to explore and evaluate the role of hermeneutics in education in the digital era, focusing on subthemes such as data interpretation, AI, social media, and big data. This article will provide a structured review, starting with an explanation of the methodology, key findings, and recommendations for future research. This structure aims to provide readers with a clear guide to understanding the challenges and potential of hermeneutics in the modern era.

2. Research Methods

This type of research is a systematic literature review, which includes publications between 2017 and 2024 that focus on hermeneutics in the context of education in the digital era, such as social media, artificial intelligence, and big data. The selected studies are peer-reviewed studies, journal articles, and academic books that discuss the application and challenges of digital hermeneutics. Studies not directly related to the topic or less relevant to the contextualization and interpretation of education in the digital era meet the exclusion criteria.

We conducted the literature search using several major databases like Scopus, Google Scholar, and ProQuest, utilizing keywords like "digital hermeneutics," "AI," "big data," and "social media." We filtered and analyzed the collected data based on its relevance, research methods, and contributions to the understanding of digital hermeneutics. We then classified relevant articles based on specific themes that emerged during the review process.

3. Results and Discussion

Implementation of Hermeneutic Method in Learning

Learning constitutes a discourse within the context of tradition (Alheit, 2018). Educators

analyze works, events, or cultural and civilizational texts. Educators serve as interpreters of a tradition. The teacher's role extends beyond merely transmitting tradition for student interpretation; rather, teachers facilitate the ongoing perpetuation of that legacy (Symonds, 2021). Despite their power, teachers utilize their knowledge and skills to push pupils to critically analyze their interpretations rather than passively accept information.

This learning technique employs a dialogue paradigm, wherein multiple students, each possessing restricted knowledge and perspectives, collaboratively attain an unforeseen understanding (Li et al., 2023). Dialogue facilitates the revelation of truth and is comprehensible to every student. As an educator, he undoubtedly assumes a leadership role among the pupils; yet, during a dialogue, he must refrain from offering predictions or interpretations regarding the emergence of the model, including its timing and manner (Grossman et al., 2022). Dialogue possesses the capacity to generate its own interpretation. Each student is responsible for their own actions, taking a position that they have never expressed before. Gadamer differentiates this procedure from recitation, wherein he asserts that students provide the teacher with anticipated responses (Pedersen, 2017). This recitation will explore the outcomes of spontaneously generated ideas. The conclusion of the debate is enlightenment and revelation. Discovery here refers to elucidating the meaning and relevance inherent in the learning content during a debate. The content offers a discourse area for dynamic and complete interpretation. The dialogue need not reveal a pre-existing concept, but rather a potential reading from an infinite array of texts, traditions, or resources (Jones, 2017).

The instructor must be well-versed in the content of the new discourse. He perceives a novel sensation from the perspectives of his students (Amory & Johnson, 2023). He can transform in various manners and must cultivate a greater appreciation for history and public events. Consequently, educators must engage in extensive reading and monitor societal transformations and emerging discourses. Our understanding and perspectives are provisional, as the material is subject to numerous interpretations, and our interpretations mirror our present limitations.

Students engage in a comparable interpretative process when analyzing texts or studying materials (Chen et al., 2023). They focus on the content, transforming the written words into creative dialogues. They allow the book to identify its key arguments and permit it to contest their preconceptions or existing perspectives. They acknowledge that the text provides not a definitive meaning but rather potential interpretations pertinent to contemporary society (Krippendorff, 2018). They endeavor to contextualize the inquiries raised by the text. The answers form the subject of the text, reflecting the personal significance the author conveys to

the reader. Through the process of reversing or reflecting upon the evolving vistas and the literal significance embedded in the text, students endeavor to uncover the message within and render it personally relevant. Table 1 presents the following literature on the application of the hermeneutic method in learning.

Table 1. The application of the hermeneutic method in learning

Library Literature	Type of Scientific Paper
Symonds (2021). <i>An 'unavoidable' dynamic? Understanding the 'traditional' learner-teacher power relationship within a higher education context.</i>	Scientific Articles
Li et al. (2023). <i>Long-lasting conceptual change in science education: the role of U-shaped pattern of argumentative dialogue in collaborative argumentation.</i>	Scientific Articles
Grossman et al. (2022). <i>Core practices for project-based learning: A guide for teachers and leaders.</i>	Reference Book
Pedersen (2017). <i>Interpretation of past texts: the application of Hans-Georg Gadamer's philosophical hermeneutics to an understanding of history education.</i>	Dissertation
Jones (2017). <i>Towards dialogic epistemology: the problem of the text.</i>	Scientific Articles
Amory & Johnson (2023). <i>Provoking novice teacher development: Cognition-and-motion in learning-to-teach.</i>	Scientific Articles
Chen et al. (2022). <i>Continuance intention mechanism of middle school student users on online learning platform based on qualitative comparative analysis method.</i>	Scientific Articles
Krippendorff (2018). <i>Content analysis: An introduction to its methodology.</i>	Reference Book

Hermeneutics and Automatic Text

Henrickson and Meroo-Peuela's (2022) research reveals that comprehending machine-generated text frequently poses difficulties. Hermeneutics can help bridge the gap between human- and machine-generated meaning by considering social and cultural contexts. Henrickson and Meroo-Peuela (2022) highlight the intricacies that emerge when automated systems like AI generate text. Despite their design to mimic human language, these systems often fall short in conveying the nuances, contexts, and emotions that human experience alone can comprehend. For example, AI that generates news texts or creative content often faces challenges in capturing subtle cultural values or specific symbolic meanings. Hermeneutics offers a context-based interpretive approach that can help understand the meaning behind these

texts. By considering social and cultural aspects, hermeneutics serves as a tool to bridge the gap in meaning between humans and machines. In this case, hermeneutics not only serves to improve the quality of human interpretation of machine texts but also enriches AI programming to be better able to understand the dynamics that exist in human communication (Gill, 2017). We can apply this hermeneutic method to develop algorithms that are more context-sensitive, thereby enhancing the relevance and value of communication between humans and automated systems.

Ethics in Digital Era Hermeneutics

Hagendorff (2020) underscores the significance of ethics in the advancement of AI and other automated systems. Hermeneutics evaluates the impact of algorithms on human decision-making in this context, ensuring that the system operates in accordance with ethical principles and justice. Hermeneutics examines the impact of algorithms on human decision-making, encompassing areas such as the court system and content recommendations on digital platforms (Sullivan et al., 2024). AI systems, when processing data and making judgments, may inadvertently generate latent biases, including prejudice based on gender, ethnicity, or socioeconomic status. Employing a hermeneutical approach, developers can assess if their systems incorporate the principles of justice, inclusion, and ethics (Pastor-Escuredo et al., 2022). The substantial impact of algorithms on daily life—from employment applications to credit algorithms in the banking industry—has made this issue increasingly significant. Hermeneutics establishes an ethical framework that is relevant to technology and its societal application, thereby laying the foundation for a system that is more equitable, transparent, and trustworthy to the broader community (Tripathi, 2017).

Hermeneutics and social media

Etter and Albu (2021) analyzes the utilization of algorithms by social media to dictate the content visible to users, thus influencing public perceptions of certain issues. Hermeneutics is essential for examining how these algorithms generate narratives, which may inadvertently shape beliefs influenced by concealed biases. The researcher proposes that a hermeneutical approach can yield profound understanding of the public's interpretation of social media information and the ethical ramifications of algorithmic biases. Etter and Albu (2021) demonstrates the impact of social media algorithms on public opinions of social and political matters. Advanced algorithms, driving social media, frequently dictate the content users encounter, fostering filter bubbles and echo chambers that encourage specific beliefs while isolating users from divergent perspectives. We can employ hermeneutics to investigate how these algorithms generate narratives, embed prejudices, or systematically influence public

opinion (Kudina, 2021). Algorithms that curate content according to consumers' interests may unwittingly perpetuate stereotypes or narrow perspectives, thus fostering societal polarization. Hermeneutics analyzes the mechanisms and rationale behind the dissemination of specific content to users, assessing the ethical and societal ramifications of this reinforced material (Maruthi et al., 2022). By comprehending the narratives constructed by algorithms, we can formulate techniques to enhance receptiveness to other viewpoints while bolstering critical awareness of the content engaged with on social media. It is crucial to mitigate algorithmic bias that may result in deception or the manipulation of public opinion.

Big Data and Contextual Meaning

Morán-Reyes (2022) contend that a profound hermeneutical approach is essential, as big data analysis may overlook significant contextual meanings without it. Large data frequently reveals patterns that require interpretation through cultural and social perspectives. Additionally, the efficacy of big data is contingent upon its integration with human interpretation that considers contextual subtleties. Understanding the data patterns generated by big data requires a specific social and cultural context to avoid misinterpretation (Graziul et al., 2023). While extensive data can reveal trends, it can often be challenging to understand their significance without an appropriate context that encompasses social values, cultural dynamics, and societal behavior patterns. Conversely, Enarsson et al. (2022) underscores the significance of synergy between algorithmic automated data processing and human interpretation. Humans possess the capacity to discern subtleties, variations in meaning, and intricate circumstances that are challenging to resolve just through statistical analysis. This partnership, through a hermeneutical approach, can uncover profound insights unattainable by raw data alone. Both researchers agree that a hermeneutical approach is crucial in ensuring that big data produces not only information but also meaning, which can lead to more informed decision-making through deeper comprehension (Morán-Reyes, 2022).

Integration of Hermeneutics in Artificial Intelligence (AI)

Alsaigh and Coyne (2021) emphasize the significance of employing hermeneutics to enhance interactions between humans and AI. Artificial intelligence, fundamentally reliant on automated data processing, frequently struggles to comprehend the subtleties and intricate circumstances inherent to human understanding. Hermeneutics can enhance the comprehension and interpretation performed by AI, hence augmenting trust and efficiency in human-AI interactions. Plueger (2024) emphasizes that the utilization of hermeneutics can enhance the interactions between people and artificial intelligence (AI). AI, dependent on data-driven algorithms, frequently has difficulties in comprehending the social context and distinct

requirements of humans. Hermeneutics can enhance AI's data interpretation, enabling the system to address user requirements in a more individualized and significant manner. This technique enables AI to adapt to complex settings, yielding more precise and contextual outcomes. The incorporation of hermeneutics in AI can enhance user trust in technology by minimizing misinterpretation and fostering a better relationship between humans and machines (Romele, 2019). This is essential for fostering more amicable, transparent, and compassionate technology interactions.

Digital Hermeneutics and Interpretation Gap

The analyzed study reveals that the interpretative gap continues to pose a significant challenge to the implementation of hermeneutics in the digital age. The disparity between the intended meaning of technology creators and its interpretation by users is a significant issue necessitating additional investigation. Hermeneutics provides a framework to reduce this gap by employing a reflective approach to meaning and contextualization (Dangal & Joshi, 2020). A primary difficulty in digital technology utilization is the interpretative disparity between developers and end users. Hermeneutics provides a contemplative and contextual framework to close this divide. Developers may create a system with a specific meaning or goal, yet users may interpret and utilize it differently than intended. By examining how users comprehend, interpret, and react to technology, hermeneutics can bridge this gap. Hermeneutical analysis ensures that users, not just developers, construct the significance of technology within their social and cultural settings, thereby enhancing its relevance and suitability to their requirements.

Research Gaps and Different Findings

Diverse research presents varying perspectives on the implementation of hermeneutics in digital education. Certain researchers, such as Knight (2019), emphasize the beneficial prospects of digital hermeneutics, whereas others, like Nassar & Kamal (2021), underscore the ethical dilemmas associated with its implementation. These different perspectives highlight a substantial research deficiency, particularly regarding the more effective and ethical application of hermeneutics in the digital realm. Numerous research studies demonstrate varied methodologies for the application of hermeneutics in the digital era. Knight (2019) says that using hermeneutics to improve digital experiences has a lot of potential, but Nassar & Kamal (2021) says that putting it into practice comes with a lot of ethical problems, such as algorithmic bias and unequal access to technology. These divergent perspectives highlight a research gap that requires attention, particularly in identifying more effective methods for the broad application of hermeneutics in the digital realm. This gap presents chances for future study that can integrate ideas from other viewpoints, resulting in a more comprehensive and adaptable

interpretative model.

Implications for Future Research

The literature suggests that hermeneutics has the potential to significantly improve our understanding of education in digital technologies, but it also highlights certain challenges that require attention (Plueger, 2024). Future research should focus on creating more adaptive hermeneutical models and fostering cross-disciplinary collaboration to thoroughly comprehend the meanings that arise in digital education. Research indicates that hermeneutics significantly enhances our comprehension of instruction in digital technologies. Nonetheless, other obstacles persist, including the interpretative disparity between humans and automated systems, as well as algorithmic bias. Future research should concentrate on creating more flexible and interdisciplinary hermeneutical models to tackle the difficulties of the digital era. This initiative must involve cooperation among technologists, cultural academics, and social researchers to develop systems that more effectively comprehend and value the intricate meanings held by humans. Thus, hermeneutics can persist in directing the development of more humane and significant technology interactions in contemporary digital education.

4. Conclusion and Suggestions

The study's conclusion demonstrates the significant role digital hermeneutics plays in education in today's modern digital era. Hermeneutics plays a role in analyzing, interpreting, and facing the challenges posed by modern technologies such as artificial intelligence, social media, and big data. By providing deeper context and meaning, hermeneutics in digital education can bridge the gap in interpretation between humans and technology. Furthermore, hermeneutics derives its model of comprehension from the domain of human studies rather than from the natural sciences. Comprehension is akin to reading a text or examining its comparable counterparts rather than perceiving an item. A text naturally carries meaning; however, without the author—due to death or cultural differences—we must adapt interpretation to the current situation. In hermeneutics, interpretation constitutes the essence of comprehension. This perspective is appropriate for educators, as their responsibility is to comprehend human behavior and creations and subsequently impart this understanding to students in the learning process.

This study recommends the need to develop a more adaptive hermeneutical approach and cross-disciplinary collaboration to explore the potential and risks associated with educational interpretation in the modern digital era. We expect future research to delve deeper into the ethical, social, and cultural aspects that emerge in the digital era of education, aiming

to foster a more balanced relationship between education, technology, and society.

5. ⁹ Conflict of Interest

The author declares no conflict of interest.

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