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Trust, Credibility and Transparency in Human-AI Interaction: Why We Need Explainable and Trustworthy AI and Why We Need It Now?

Aras Bozkurt, Ramesh C Sharma

Abstract: Generative Artificial Intelligence (GenAI) has rapidly evolved to perform complex tasks across diverse domains. Despite its potential to redefine how we work and learn, generative AI's effectiveness hinges on the extent to which it is trusted—by individuals, organizations, and broader societal systems. At the heart of this issue lie three interrelated concepts: trust, credibility, and transparency. In particular, the opaque nature of AI “black boxes,” where sophisticated machine learning algorithms yield outcomes without clear explanations, exacerbates public concern and highlights the necessity of more explainable, responsible AI solutions. Current literature and practice indicate that trust and credibility in AI are multifaceted, encompassing technical, ethical, social, and psychological considerations. This complexity is compounded in educational settings, where generative AI's integration demands robust transparency to mitigate fear, enhance learning outcomes, and secure a social license for AI-driven interventions. Explainable and trustworthy AI stands out as a dynamic paradigm shift, offering interpretability at both model and outcome levels. This approach enables end-users and developers alike to examine the rationale behind AI-driven decisions, preserving human oversight and reinforcing user confidence. However, merely defining explainable and trustworthy AI does not ensure its adoption: the ongoing challenge lies in building AI systems that are simultaneously innovative, transparent, and robust. Moving forward, the credibility and long-term sustainability of AI applications will depend on our collective ability to integrate technical refinements, adaptive regulations, and societal dialogue. By doing so, we can harness GenAI's vast potential as a transformative force—guided by enduring human values rather than overshadowed by unchecked power.

Keywords: artificial intelligence, generative AI, AI in education, AIED, trust and credibility, explainable AI, reliable AI, trustworthy AI, teaching and learning, higher education.

Highlights

What is already known about this topic:

- Trust and transparency are fundamental to AI acceptance and social license.
- Generative AI's “black box” nature heightens user concerns about risks and uncertainties.

What this paper contributes:

- Positions explainable and trustworthy AI as a core strategy for fostering trust and credibility.
- Proposes a continuous, evolving approach emphasizing transparency, accountability, and fairness.

Implications for theory, practice and/or policy:

- Highlights the need for ethical, technical, and societal collaboration in AI deployment.
- Calls for updated guidelines, stakeholder dialogue, and trust-driven innovation across sectors.



Introduction: What Would It Be Like Without Trust and Credibility?

“All the world is made of faith, and trust, and pixie dust.”
— J. M. Barrie (*articulated in Peter Pan*)

Generative AI is a powerful and transformative technology with the potential to significantly impact diverse fields. However, its broader acceptance depends on the degree of trust it inspires, the reliability of its outputs, and the transparency of human-AI interactions (Bozkurt et al., 2023; Bozkurt et al., 2024). If we can establish trust, credibility, and transparency, we can decide whether this technology will be a tool or an agent in the various ecosystems in which we interact and engage in. This being the case, it is critical to examine these concepts and justify why we need not only generative AI, but also versions that are explainable, trustworthy, responsible, and worthy of public confidence.

Why does Generative AI matter?

Generative AI is a sophisticated technology with immersive capabilities (Bozkurt, 2023a, 2023b, 2024; Bozkurt & Sharma, 2024; Tlili et al., 2023), indeed, it is a force with both light and dark sides (Bozkurt & Bae, 2024). Given this dual nature, such a force must be controlled, and unless we can control it, there is always the possibility that it will turn to the dark side. But can we control a technology we cannot trust? What should we do to build trust, and how should technology be positioned in our lives? This is where this paper comes in and justifies why concepts like trust, credibility, and transparency are critical and why we need explainable and trustworthy AI technologies.

State of the Art in Generative AI Regarding Trust and Credibility

To understand how trust and credibility can be established, we must first examine the current challenges associated with AI systems. Accordingly, AI's autonomous functioning and reliance on machine learning algorithms, often characterized as “black boxes,” introduce risks and uncertainties for users (Choung et al., 2023; Saeed & Omlin, 2023). The limited transparency of these systems renders their decision-making processes unpredictable which highlights the importance of trust as a means to mitigate potential risks (Ali et al., 2023; Choung et al., 2023; Minh et al., 2022; Vilone & Longo, 2020). From this perspective, the levels of trust and credibility emerge as fundamental factors for acceptance—whether of an individual, an organization, or an entity such as generative AI (Alzyoud et al., 2024; Siau & Wang, 2018). These factors also represent essential human mechanisms for managing vulnerability, uncertainty, complexity, and ambiguity, collectively perceived as risk (Choung et al., 2023). Therefore, without adequately addressing trust and credibility, the integration of generative AI can provoke fear and anxiety, ultimately hindering its broader acceptance (Gillespie et al., 2023; Lukyanenko et al., 2022).

Trust, credibility, and transparency in human-AI interaction form a multifaceted social process shaped by various factors (Hoff & Bashir, 2015; Lee & See, 2004; Yang & Wibowo, 2022). Indeed, the matter of trust and credibility in AI is not only multifaceted but also deeply interwoven with technological, economic, social, political, and psychological considerations (Lukyanenko et al., 2022). Consequently, integrating generative AI into educational processes requires a renewed focus on trust, credibility, and further transparency (Kim et al., 2022). Moreover, these qualities remain vital for AI's continued social license (Lockey et al., 2021).

To fully harness the potential of both generic and generative AI technologies, we must ensure trust, credibility, and transparency in both the technology and its developers. This, in turn, necessitates responsible and transparent handling of issues such as bias, explainability, data management, data policy disclosure, and design choices (Rossi, 2018). Emphasizing these considerations demonstrates why we need explainable, responsible, and trustworthy AI—and why we need it now.

Explainable and Trustworthy AI as an Evolving Paradigm

“Every change of scene requires new expositions, descriptions, explanations.”
— Milan Kundera

The emergence of Generative AI has expanded the capabilities of artificial intelligence from simple recognition tasks to generating solutions for diverse applications. As these solutions grow increasingly complex and multifaceted, new demands and opportunities for explainable and trustworthy AI have arisen (Schneider, 2024; Vilone & Longo, 2021).

Explainable AI techniques play a crucial role in helping users understand generative AI outputs at both the input and overall model levels (Schneider, 2024). By offering clear justifications, explainable AI reinforces human agency, allowing users to make informed decisions when interacting with AI systems (Ali et al., 2023; Chamola et al., 2023; Gunning & Aha, 2019; Khosravi et al., 2022). These explanations also foster greater transparency and interpretability in AI, thereby enhancing user understanding, trust, and accountability (Rane & Paramesha, 2024; Saeed & Omlin, 2023; Samek et al., 2019).

As AI—particularly generative AI—continues to permeate multiple industries, it is essential to maintain fairness, transparency, accountability, robustness, privacy, and ethical considerations (Rane & Paramesha, 2024; Saeed & Omlin, 2023). These elements collectively define the explainability and trustworthiness of AI systems, thereby guiding the responsible development of GenAI applications (See Table 1 for an overview of explainable AI techniques).

Table 1. Principles of Explainable AI, along with strategies for implementation, benefits, and associated challenges (Rane & Paramesha, 2024).

	Principles	Description	Implementation Strategies	Benefits	Challenges
1	Transparency	Clear decision-making processes.	Open-source models, detailed docs, clear communication.	Builds trust, facilitates audits.	Risk of info overload, sensitive exposure.
2	Interpretability	Understandable model outputs.	Simplified models, visual tools, user-friendly interfaces.	User trust, easier debugging.	Complexity vs. performance.
3	Accountability	Mechanisms for responsibility.	Policies, logging, regular audits.	Responsible usage, ethical standards.	Resource-intensive frameworks.
4	Fairness	Bias-free decisions.	Bias detection, diverse data, fairness audits.	Promotes equality, better perception.	Hidden biases.
5	Reliability	Consistent performance.	Rigorous testing, redundancy, monitoring.	User confidence, reduced risk.	High maintenance, unpredictable failures.
6	Privacy	Protect user data.	Encryption, anonymization, access controls.	Data protection, compliance.	Balancing utility and privacy.
7	User-Centric Design	Tailored to user needs.	User research, iterative design, customization.	User satisfaction, usability.	Resource-intensive, time-consuming.
8	Validation and Testing	Continuous accuracy checks.	Automated testing, regular updates, real-world validation.	Ongoing accuracy, early issue detection.	Continuous resources, deployment delays.
9	Ethical Considerations	Align with societal values.	Ethical guidelines, stakeholder consultations.	Responsible development, trust.	Complex enforcement.
10	Robustness	Resilience to threats.	Security measures, adversarial testing.	Stability, enhanced security.	Balancing robustness and performance.
11	Contextual Awareness	Relevant explanations.	Contextual modeling, adaptive algorithms.	Relevant, useful explanations.	Complex implementation.
12	User Feedback Integration	Continuous improvement.	Feedback loops, surveys, iterative processes.	Better alignment, ongoing improvement.	Managing feedback, bias risk.
13	Regulatory Compliance	Adherence to regulations.	Compliance audits, adherence to standards.	Avoids penalties, promotes trust.	Evolving regulations.
14	Clarity of Communication	Simple, clear explanations.	Simplified language, visual aids, user training.	User understanding, reduced errors.	Balancing simplicity and completeness.
15	Empathy and understanding	Address user concerns.	NLP, sentiment analysis, support systems.	User trust, positive experiences.	Complex implementation, emotion misinterpretation.

Regulatory Initiatives and Guidelines

In recognition of AI's expanding influence, several global initiatives have been launched (Aler Tubella et al., 2024). DARPA's *Explainable AI (XAI) Program* (Defense Advanced Research Projects Agency, 2017; Gunning & Aha, 2019) and the EU's GDPR (European Council, 2018) exemplify international efforts to address the challenges of AI governance.

More formally, the High-Level Expert Group on AI (European Commission, 2019) released the *Ethics Guidelines for Trustworthy AI*, which identified three foundational requirements for AI systems throughout their lifecycle:

1. Lawfulness – Adherence to applicable laws and regulations.
2. Ethicality – Respect for ethical principles and societal values.
3. Robustness – Resilience from both technical and social standpoints.

Additionally, the European Commission (2019) has integrated seven key principles into its AI Act proposal. These principles also feature prominently in the *White Paper on AI* (European Commission, 2020). These are: human agency and oversight, technical robustness and safety, privacy and data governance, transparency, diversity, non-discrimination, and fairness, societal and environmental well-being, and accountability.

Reconciling Terminology

In addition to already being an inherently multidimensional term (See Figure 1 and Figure 2), across the literature, terms such as “explainable AI,” “trustworthy AI,” “understandable AI,” “reliable AI,” “ethical AI,” “transparent AI,” and “interpretable AI” are often used interchangeably. While consensus is lacking on the precise definitions and processes these labels entail, this study considers *explainable AI* as an umbrella concept. In this study, explainable AI is defined as:

the combination of strategies and processes that make AI models more understandable, interpretable, transparent, reliable, and trustworthy—without substantially compromising performance—and thus reinforce public trust and credibility by clarifying the models' decision-making logic.

Figure 1. Multidimensional nature of explainable and trustworthy AI (Li et al., 2023).

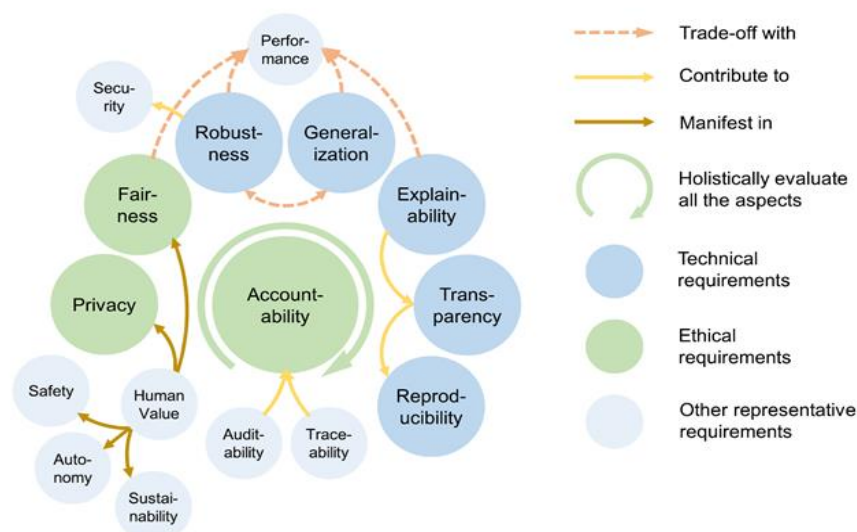
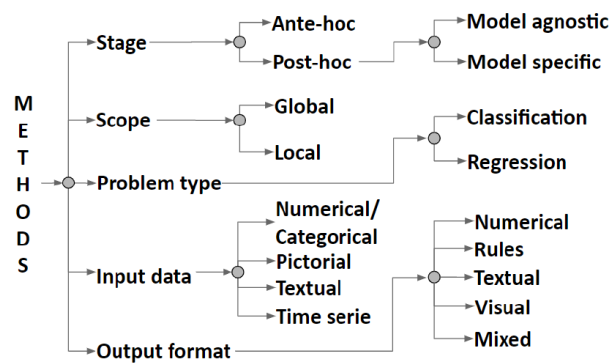


Figure 2. Explainable AI methods (Vilone & Longo, 2020).



Despite these definitions and frameworks, defining explainable and trustworthy AI systems is not the same as implementing them (Slama et al., 2024). Building genuinely explainable, trustworthy, transparent, and robust AI solutions remains a significant challenge, requiring continuous technical innovation and societal dialogue. As AI technologies evolve and our understanding of their societal impacts deepens, trust and credibility within the AI ecosystem will inevitably progress as well (Li et al., 2023).

Suggestions and Implications

Ensuring trust and credibility in AI demands a careful blend of interdisciplinary collaboration, transparent communication, and iterative development. Experts from fields like ethics, computer science, and psychology should jointly design systems that offer clear, accessible explanations of AI outputs. Equally crucial is retaining human agency through oversight mechanisms, allowing individuals to intervene when necessary. By adopting these strategies—reinforced by rigorous regulatory alignment—developers can mitigate the “black box” dilemma, reduce biases, and foster user confidence.

These measures carry significant implications across educational, organizational, and societal landscapes. In academia, responsible AI integration must shape teaching methods and curricula, while corporations should anchor ethical AI principles in their core policies. At the societal level, embedding fairness and privacy safeguards can alleviate fear and anxiety, ensuring that AI augments rather than undermines public welfare. Innovations in interpretability and bias detection should evolve hand in hand with ethical guidelines, promoting continued research into transparent, human-centered AI ecosystems.

Conclusion

“An explanation of cause is not a justification by reason.”
— C. S. Lewis

Trust may be as delicate as “pixie dust,” yet it is indispensable to the responsible growth of AI technologies. As generative AI becomes deeply embedded in fields such as education, healthcare, and industry, a firm emphasis on trust, credibility, and transparency is non-negotiable. Without robust frameworks of explainability and responsibility, today’s pioneering AI solutions risk mutating into powerful yet opaque systems that spark societal unease rather than serve the common good.

Although emerging regulations and global guidelines offer a valuable starting point, truly explainable and trustworthy AI cannot be captured by a one-time technical fix. Every line of code and design decision redefines both AI’s functional capabilities and its human implications. Prioritizing interpretability preserves human agency; demanding fairness and accountability ushers in proactive ethical standards;

and safeguarding robustness and privacy underpins genuine public confidence. In reality, AI development is an ongoing, collective endeavor—one that thrives on empathy, moral judgment, and open communication among developers, policymakers, end-users, and society at large.

At the intersection of human-AI collaboration, trust itself—encompassing strategic, behavioral, cognitive, and emotional dimensions—forms the foundation of meaningful engagement. Explainable AI must therefore remain a dynamic process, shaped by continuous feedback, frequent updates, and a deep commitment to transparency. By illuminating how AI systems reach their conclusions and respecting the complexity of human values, we resist the illusion of “uncontrolled power” and ensure AI solutions complement, rather than eclipse, human judgment. Ultimately, striking this delicate balance is what will allow us to harness AI’s vast potential as a force for societal progress—bright, steady, and guided by enduring human principles.

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Because this study doesn't involve any living entities, an ethics review is not applicable.

Conflict of Interest

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Data Availability Statement

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