

# The value of visualization literacy

DERYA AKBABA, KTH Royal Institute of Technology, Sweden

This position paper presents three provocations on visualization literacy. Drawing on entanglement and feminist epistemologies, the provocations both trouble the value of visualization literacy assessments and what visualization literacy values. The purpose of the paper is to spark discussion about what world-views we are perpetuating through the operationalization of visualization literacy as it stands currently, and asks its readers to consider other visions for what visualization literacy could be.

CCS Concepts: • **Human-centered computing** → **Visualization**.

Additional Key Words and Phrases: visualization literacy, critical visualization, position paper

## ACM Reference Format:

Derya Akbaba. 2026. The value of visualization literacy. In *Proceedings of Workshop on Data Literacy. (CHI '26)*. ACM, New York, NY, USA, 6 pages.

## 1 Introduction

*Valuing what we measure  
or measuring what we value?* [3]

In this provocation, I build on my earlier work that puts forward visualizations as entangled objects [1], inseparable from and meaningless without the relationships and contexts from which they derive. While it is impossible to study every single social, technical, personal, technological, cultural — insert another topic + *-al* — it is important to understand which of these entanglements impact and shape visualization literacy. This sentiment is echoed in the recent STAR report in which the authors highlight that visualization literacy is “beyond merely a set of practical skills” [32]. And yet, most assessments of visualization literacy reinforce narrow skillsets of visualization literacy by assessing skills like finding outliers or reading trends on a line chart. It is unclear whether these assessments truly reflect the larger ambitions of supporting visualization literacy, or an individual’s ability to confidently use, construct, and engage with graphical representations of data [4, 32]. Instead of advocating for entirely removing assessment — after all, assessment is an important strategy for engaging pupils in recall and supporting metacognition [25, 33] — I question how we are conducting assessments, in what context, and for whose benefit. In this work, I ask whether we are truly measuring what we value or valuing what we can measure [3].

## 2 Positionality

Inline with rising trends and calls to add positionality statements — across disciplines like AI [27], quantitative psychology [15], and HCI [29] — I add my positionality to provide relevant context from which these provocations stem. Including context not only supports conversations about how values affect research, but also provides avenues for increased dialogue across disciplines, which is critical for communicating and accomplishing interdisciplinary goals, like those outlined in this workshop’s proposal [14]. As such, the provocations that I put forward in this paper stem from witnessing the productive capacity of operationalizing feminist and critical theories in the fields of

---

Author’s Contact Information: Derya Akbaba, akbaba@kth.se, KTH Royal Institute of Technology, Stockholm, Sweden.

---

visualization and HCI. Not only do these theories question design norms, consequently opening up new design spaces and ways to relate to technology (e.g. [19, 23]), but also, they challenge the ways that technology reinforces hierarchies and power structures [7]. Falling from this, my provocations deal with questions of power, access, and entanglements.

Another important dimension of my position stems from a recent collaboration with a local non-profit and science museum. In this line of research, we co-designed workshops with the non-profit’s manager and museum educators for teenagers and young children. These workshops made use of data physicalization methods [31] to turn personal data into visual representations. Co-designing the workshops meant that we had to implicitly teach data visualization skills to our collaborators – like how to map data to visual representations – and it also meant we needed to develop visualizations that were accessible to our target groups. Further, we incorporated elements of creative data literacy [6] – like using group-generated, personal datasets – to center personally relevant datasets and lower the barrier to entry. The data crafts were not pedagogical by design, but required data and visualization literacy for participants to engage. Throughout the workshops, we also paid attention to feminist matters of concern, taking care not to reinforce ideas around data as objective or visualizations as neutral [9]. The provocations reflect this experience, along with a personal interest in learning sciences and CS education research, to bring forward questions around the contexts of assessment, like education and community engagement.

### 3 Provocations

The three provocations below will *ideally* lead to productive conversations about the values embedded in the concepts, processes, and assessments of visualization literacy. By drawing on entanglements and feminist scholarship, I *re-locate* visualization literacy within a broader context of education and society, to relate discussions and decisions within visualization literacy to their entanglements.

#### 3.1 Should visualization literacy be measured?

I begin with interrogating the propensity to *measure* visualization literacy. While prior work offers motivation for *why* it is important to measure visualization literacy – like understanding how much (or how little) individuals can identify graphical misinformation [13] or how individuals make appropriate decisions regarding health data [12] – the *employment* of a standardized test is less justified<sup>1</sup>. These assessments, by design, measure right and wrong answers on how to conduct certain tasks, such as *find trends*. Such tasks ignore the contextual and personal ways that people read and understand visualizations and their messages. As an illustrative example, Xiong et al. [34] found that when individuals believed the variables visualized were correlated, they were more likely to perceive a correlation in the data – even when it did not exist. Several other works highlight how people relate personally to data and visualizations [20, 22, 24]. If we already have evidence that people read visualizations from personally-situated contexts, what information do we miss when we attempt to standardize the visualization reading experience through a series of standardized tests?

Measuring inevitably leads to comparison and ranking. This is one of the motivations in VLAT, where the authors note: “The test taker will not only know an absolute score but also know a relative standing among all test takers through the percentile rank of the score.” [18]. Perhaps the authors were hinting at metacognition – an important aspect of learning where pupils reflect

<sup>1</sup>Relatedly, the role of standardized testing has been highly debated within educational spaces for decades now (see Siegel [28] for an analysis of responsible assessment). These discussions highlight the problematic nature of introducing high-stakes testing into schools, inevitably erasing other motivating factors in the name of efficiency. It is perhaps time for our community to also look at these debates and question the necessity of assessment of similar forms.

and understand upon the limits of their knowledge [2, 25] — but techniques for supporting such critical reflection are not embedded in the assessment itself. Instead, comparing scores to others may elicit doubt in one’s self-efficacy — or belief in one’s ability to accomplish a task [5] — resulting in avoiding related tasks or challenges in the future. Finally, measurement leans into the idea that progress is synonymous with higher scores. This logic draws on early Enlightenment [10] ideals that progress can be measured, that it is neutral, and that outliers are lazy or underperformers. We have seen this consequence in schools after the introduction of standardized tests and ranking systems—schools began to teach to the test above other metrics [3, 10]. This leads nicely into the next provocation around education.

### 3.2 What is the role of education in visualization literacy?

The second provocation comes from my inability to talk about literacy without discussing education. While it is understandable that tests for literacy can occur outside formal educational settings, it remains crucial to consider how people are learning about data and visualizations to begin with. As others have previously mentioned [32], visualization literacy requires complementary literacies, like data, scientific, and statistical literacy. Where are these literacies taught, and what role does visualization implicitly and explicitly play in teaching these concepts? Further, *who* is responsible for teaching visualization literacy, especially when it can be applied across multiple disciplines and serve as an educational tool itself? Of course, there exist teachers in schools, but given the broad contexts in which visualizations occur — news articles [11], museums [30], and personal devices [21] — where does education about visualizations happen? For example, in related fields, researchers identified families as a third space for education about AI [8]. Do our current definitions of visualization literacy account for these different contexts? If we wish to acquire a more nuanced perspective of what shapes (and counts as) visualization literacy, we should direct our attention to areas where learning and education happen, in order to interrogate and understand the varying goals and priorities.

Echoing Biesta [3], when we consider the education around and about visualization, we must understand what decisions led to these educational ecosystems, and in turn, what value systems they carry with them. We need only to look at history to see that the education around visualization is rife with value judgments, favoring some actors over others. In the example of Elizabeth Palmer Peabody — a traveling school teacher in 1850’s United States — her quilt-based chronological data visualizations were intentionally complex and participatory [16]. But her work is ignored in the history of visualization in favor of examples that reinforce Enlightenment era ideals, like clarity and precision [16]. Others have called for a decolonization of education around visualization, demonstrating that what counts as a *good* visualization is historically and politically loaded [17]. In another example, Rakotondravony and colleagues [26] discuss the lingering impact of French colonization on modern visualization literacy. They explain that technology and scientific terms are taught in French, and so a majority of the population lacks the “linguistic tools for verbalizing data and visualizations.” Further, visualization literacy assessments stemming from Western educational systems are misaligned with the conventions, materials, and curriculum within Madagascar, which result in tests that assess culture and a specific type of socialization to visualizations more so than visualization literacy itself. And so understanding the context in which literacy is gained is just as important because it reveals how values are embedded within metrics and definitions of success.

### 3.3 Who cares about literacy?

Multiple papers have cited reasons why literacy is important, which I summarize as data-literate citizens who are capable of making informed data-driven decisions and capable of reasoning with visual representations. Underlying this wish is a vision of what citizens and society should look like.

But to what end? Whenever there is an articulation of what people *should* be able to do, it comes with implicit boundaries and limitations. If we ask, who cares about literacy, we can begin to see the seams of such articulations. From the perspective of visualization researchers, do we envision a form of visualization literacy that distinguishes when to use an LLM to complete a task, akin to the introduction of calculators in math? Or, from the perspective of employers, should visualization literacy include skills for using visualization mostly as a rhetorical device at any cost, close to but not exactly lying with data? Or, from the perspective of governments, where visualization literacy encourages disobedience and revolution? These are all valid forms of visualization literacy – falling into the general “abilities, or “competencies”, in the context of visualization” [32], and yet they are perhaps less desirable than other use cases.

#### 4 Conclusion

In this short paper, I highlight three provocations to trouble implicit assumptions in the current discourse about visualization literacy. Each provocation draws attention to different ways that literacy is inseparable from societal contexts and value systems. These considerations illustrate that visualization literacy as a concept is embedded with values of how literacy should be assessed and used. Without careful consideration of these assumptions, we risk perpetuating potentially harmful norms and hegemonic ideals, robbing ourselves of the opportunity to imagine different futures.

#### Acknowledgments

Thank you, José Bener, for thought-provoking discussions about literacy and for providing excellent feedback on a draft of this paper. The work is funded in part by the InspireLab at KTH Royal Institute of Technology.

#### References

- [1] Derya Akbaba, Lauren Klein, and Miriah Meyer. 2025. Entanglements for Visualization: Changing Research Outcomes through Feminist Theory. *IEEE Transactions on Visualization and Computer Graphics* 31, 1 (2025), 1279–1289. doi:10.1109/TVCG.2024.3456171
- [2] Roger Azevedo. 2020. Reflections on the field of metacognition: issues, challenges, and opportunities. *Metacognition and Learning* 15, 2 (2020), 91–98. doi:10.1007/s11409-020-09231-x
- [3] Gert Biesta. 2009. Good education in an age of measurement: on the need to reconnect with the question of purpose in education. *Educational Assessment, Evaluation and Accountability* 21, 1 (Feb. 2009), 33–46. doi:10.1007/s11092-008-9064-9
- [4] Jeremy Boy, Ronald A. Rensink, Enrico Bertini, and Jean-Daniel Fekete. 2014. A Principled Way of Assessing Visualization Literacy. *IEEE Transactions on Visualization and Computer Graphics* 20, 12 (Dec. 2014), 1963–1972. doi:10.1109/TVCG.2014.2346984
- [5] Denise Chalmers and Lynne Hunt (Eds.). 2013. *University teaching in focus: a learning-centred approach*. Routledge, Abingdon, Oxon ; New York.
- [6] Catherine D’Ignazio. 2022. Creative data literacy: Bridging the gap between the data-haves and data-have nots. *Information Design Journal* (July 2022), 6–18. doi:10.1075/idj.23.1.03dig
- [7] Catherine D’ignazio and Lauren F Klein. 2023. *Data feminism*. MIT press.
- [8] Stefania Druga, Fee Lia Christoph, and Amy J Ko. 2022. Family as a Third Space for AI Literacies: How do children and parents learn about AI together?. In *CHI Conference on Human Factors in Computing Systems*. ACM, New Orleans LA USA, 1–17. doi:10.1145/3491102.3502031
- [9] Catherine D’Ignazio and Lauren F Klein. 2016. Feminist data visualization. Workshop on Visualization for the Digital Humanities (VIS4DH), Baltimore. IEEE.
- [10] Wendy Nelson Espeland and Mitchell L. Stevens. 2008. A Sociology of Quantification. *European Journal of Sociology* 49, 3 (2008), 401–436. doi:10.1017/S0003975609000150
- [11] Yu Fu and John Stasko. 2024. More Than Data Stories: Broadening the Role of Visualization in Contemporary Journalism. *IEEE Transactions on Visualization and Computer Graphics* (2024), 1–20. doi:10.1109/TVCG.2023.3287585

- [12] Mirta Galesic and Rocio Garcia-Retamero. 2011. Graph literacy: A cross-cultural comparison. *Medical decision making* 31, 3 (2011), 444–457.
- [13] Lily W. Ge, Yuan Cui, and Matthew Kay. 2023. CALVI: Critical Thinking Assessment for Literacy in Visualizations. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*. ACM, Hamburg Germany, 1–18. doi:10.1145/3544548.3581406
- [14] Lily W. Ge, Michael S. Horn, Duri Long, Judith E. Fan, and Matthew Kay. 2026. Data Literacy for the 21st Century: Perspectives from Visualization, Cognitive Science, Artificial Intelligence, and Education. In *CHI EA '26*. Association for Computing Machinery. <https://osf.io/kt3xb/files/wr67f>
- [15] Michelle K. Jamieson, Gisela H. Govaart, and Madeleine Pownall. 2023. Reflexivity in quantitative research: A rationale and beginner’s guide. *Social and Personality Psychology Compass* 17, 4 (April 2023). doi:10.1111/spc3.12735
- [16] Lauren Klein. 2022. What Data Visualization Reveals: Elizabeth Palmer Peabody and the Work of Knowledge Production. *Harvard Data Science Review* 4, 2 (2022), 1–34.
- [17] Lauren Klein, Tanvi Sharma, Jay Varner, Shiyao Li, Margy Adams, Nicholas Yang, Dan Jutan, Anna Mola, Zhou Fang, Yang Li, and Sila Munro. [n. d.]. *Data by Design: An Interactive History of Data Visualization, 1789-1900*. ([n. d.]). 2024 public beta..
- [18] Sukwon Lee, Sung-Hee Kim, and Bum Chul Kwon. 2017. VLAT: Development of a Visualization Literacy Assessment Test. *IEEE Transactions on Visualization and Computer Graphics* 23, 1 (Jan. 2017), 551–560. doi:10.1109/TVCG.2016.2598920
- [19] Ann Light. 2011. HCI as heterodoxy: Technologies of identity and the queering of interaction with computers. *Interacting with Computers* 23, 5 (2011), 430–438. doi:10.1016/j.intcom.2011.02.002
- [20] Haihan Lin, Maxim Lisnic, Derya Akbaba, Miriah Meyer, and Alexander Lex. 2026. Here’s what you need to know about my data: Exploring Expert Knowledge’s Role in Data Analysis. *IEEE Transactions on Visualization and Computer Graphics* 32, 1 (2026), 1186–1196. doi:10.1109/TVCG.2025.3634821
- [21] Jimmy Moore, Pascal Goffin, Jason Wiese, and Miriah Meyer. 2021. Exploring the Personal Informatics Analysis Gap: ‘There’s a Lot of Bacon’. *IEEE Transactions on Visualization and Computer Graphics (VIS)* (2021), 95–105. doi:10.1109/TVCG.2021.3114798
- [22] Michelle Morgenstern, Amy Rae Fox, Graham M. Jones, and Arvind Satyanarayan. 2026. Visualization Vibes: The Socio-Indexical Function of Visualization Design. *IEEE Transactions on Visualization and Computer Graphics* 32, 1 (2026), 1284–1294. doi:10.1109/TVCG.2025.3634814
- [23] Joo Young Park, Stacy Hsueh, Nadia Campo Woytuk, Xuni Huang, Marianela Ciolfi Felice, and Madeline Balaam. 2024. Critiquing Menstrual Pain Technologies through the Lens of Feminist Disability Studies. In *Proceedings of the CHI Conference on Human Factors in Computing Systems*. ACM, Honolulu HI USA, 1–15. doi:10.1145/3613904.3642691
- [24] Evan M. Peck, Sofia E. Ayuso, and Omar El-Etr. 2019. Data is Personal: Attitudes and Perceptions of Data Visualization in Rural Pennsylvania. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (Glasgow, Scotland Uk) (*CHI '19*). Association for Computing Machinery, New York, NY, USA, 1–12. doi:10.1145/3290605.3300474
- [25] James Prather, Brett A. Becker, Michelle Craig, Paul Denny, Dastyni Loksa, and Lauren Margulieux. 2020. What Do We Think We Think We Are Doing?: Metacognition and Self-Regulation in Programming. *ICER 2020 - Proceedings of the 2020 ACM Conference on International Computing Education Research* (2020), 2–13. doi:10.1145/3372782.3406263
- [26] Noëllë Rakotondravony, Priya Dhawka, and Melanie Bancillon. 2023. Beyond English: Centering Multilingualism in Data Visualization. In *Visualization for Social Good*. doi:10.48550/arXiv.2309.06659
- [27] Hope Schroeder, Akshansh Pareek, and Solon Barocas. 2025. Disclosure without Engagement: An Empirical Review of Positionality Statements at FAccT. In *Proceedings of the 2025 ACM Conference on Fairness, Accountability, and Transparency (FAccT '25)*. Association for Computing Machinery, New York, NY, USA, 1195–1210. doi:10.1145/3715275.3732079
- [28] Harvey Siegel. 2004. High stakes testing, educational aims and ideals, and responsible assessment. *Theory and Research in Education* 2, 3 (2004), 219–233.
- [29] Aneasha Singh, Martin Johannes Dechant, Dilisha Patel, Ewan Soubutts, Giulia Barbareschi, Amid Ayobi, and Nikki Newhouse. 2025. Exploring Positionality in HCI: Perspectives, Trends, and Challenges. In *Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems (CHI '25)*. Association for Computing Machinery, New York, NY, USA, Article 451, 18 pages. doi:10.1145/3706598.3713280
- [30] Mara Solen, Nigar Sultana, Laura Lukes, and Tamara Munzner. 2025. DeLVE into Earth’s Past: A Visualization-Based Exhibit Deployed Across Multiple Museum Contexts. *IEEE Transactions on Visualization and Computer Graphics* 31, 1 (2025), 952–961. doi:10.1109/TVCG.2024.3456174
- [31] Alice Thudt, Uta Hinrichs, and Sheelagh Cpendale. 2017. Data craft: integrating data into daily practices and shared reflections. In *CHI 2017 Workshop on Quantified Data Social Relationships, Denver*.
- [32] Matthew Varona, Karen Bonilla, Maryam Hedayati, Alark Joshi, Lane Harrison, Matthew Kay, and Carolina Nobre. 2025. The State of the Art in Visualization Literacy. arXiv:2509.01018 [cs] doi:10.48550/arXiv.2509.01018

- [33] Grant Wiggins and Jay McTighe. 2005. Thinking like an Assessor. *Understanding by Design* 2005 (2005), 146–171.
- [34] Cindy Xiong, Chase Stokes, Yea-Seul Kim, and Steven Franconeri. 2023. Seeing What You Believe or Believing What You See? Belief Biases Correlation Estimation. *IEEE Transactions on Visualization and Computer Graphics* 29, 1 (2023), 493–503. doi:10.1109/TVCG.2022.3209405