

# Liberatory Computing: Empowering African American Students Through Data Activism

Raechel Walker

raechelw@mit.edu

Massachusetts Institute of Technology

Media Arts and Sciences Department

Cambridge, MA, USA

## CCS Concepts

• **Human-centered computing** → **Empirical studies in HCI**.

## Keywords

transformative youth organizing, arts-based abolitionist education, liberatory computing, data activism, AI education, data science, critical participatory action research

## ACM Reference Format:

Raechel Walker. 2025. Liberatory Computing: Empowering African American Students Through Data Activism. In *Proceedings of the 2025 Conference for Research on Equitable and Sustained Participation in Engineering, Computing, and Technology (RESPECT 2025)*, July 14–16, 2025, Newark, NJ, USA. ACM, New York, NY, USA, 4 pages. <https://doi.org/10.1145/3704637.3734750>

## 1 Research Description

### 1.1 Motivation

Computing curricula often reinforce a narrow and damaging narrative about African American communities by focusing on crime prediction and policing[3, 7, 13, 17]. This emphasis perpetuates the harmful stereotype that these communities are primarily sites of criminal activity rather than hubs of innovation, creativity, and resilience[14]. In contrast, "liberatory computing", a framework I coined, offers an approach to counteract these narratives by integrating racial identity development, critical consciousness, collective obligation, a liberation-centered academic identity, and activism skills into computing education[21, 22]. By centering data activism in the curriculum, students are encouraged to use data to advocate for racial and social justice. This work focuses on two related programs: the first introduced students to using data science to support minoritized communities, while the second incorporated collaboration with community organizers, fostering desire-based research—an approach that prioritizes community aspirations over deficit-based narratives[21].

### 1.2 Literature Review

The concept of liberatory computing is rooted in the intersection of liberation tools and data activism, drawing from scholars such as Aaliyah El-Amin and Ruha Benjamin[2, 4, 22]. The framework

challenges the traditional role of computing education, which often lacks a social justice lens[19]. Liberatory computing advocates for an approach that incorporates racial identity development, critical consciousness, collective obligation, and activism skills into computing education, thereby fostering a more inclusive and equitable environment for all students[20, 21].

Previous studies by Amy J. Ko, Nichole Pinkard, and Stephanie Jones have shown that when students engage in social justice-oriented computing, they develop a stronger sense of identity and purpose, which leads to increased persistence in STEM fields[8, 12]. These studies highlight the positive impact of integrating social justice themes into computing education, underscoring the significance of fostering both technical and social awareness[6]. My work builds upon this foundation by incorporating liberatory computing principles into computing curricula, demonstrating their positive impact on students' racial identity development and activism skills.

Also, my research aligns with Sepehr Vakil's (2018) critique of equity in computing education, as detailed in "Toward a Justice-Centered Approach to Equity in CS Education," and Amy J. Ko's advocacy for justice-centered computing[15, 18]. This alignment highlights the role of critical reflection in dismantling systemic biases in computing education. Critical reflection—an essential tool in liberatory computing—encourages students to critically examine their own identities and the societal structures that influence their experiences with technology.

Additionally, I expand my discussion of race and technology literature by building on the works of Alex Hanna et al. (2020), Ihudiya Finda Ogbonnaya-Ogburu et al. (2020), Ruha Benjamin (2019), Safiya Noble (2018), and others[2, 5, 10, 11]. This body of work emphasizes the importance of critical reflection as a key intervention for addressing the root causes of systemic racism in computing and AI. It highlights how race and identity shape technological development and how, by centering minoritized voices, we can build more inclusive and ethical AI systems. Finally, drawing upon Francheska et al.'s (2023) paper, "Critical Love Praxis as Pro-Black Pedagogy," which further illustrates how critical reflection promotes inclusive learning environments, affirming liberation tools as a transformative framework within computing education[16]. The integration of critical reflection in computing education ensures that students not only engage with technology but also challenge the systems that perpetuate inequity.

### 1.3 Hypothesis, Thesis, and Key Ideas

This research hypothesizes that integrating liberatory computing into computing education can empower African American students to challenge systemic oppression through data analysis and

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).  
RESPECT 2025, Newark, NJ, USA

© 2025 Copyright held by the owner/author(s).

ACM ISBN 979-8-4007-1355-2/2025/07

<https://doi.org/10.1145/3704637.3734750>

activism[20, 21]. By incorporating principles of racial justice and social activism into the computing curriculum, students are equipped with the tools to critically analyze data and use technology as a means of advocating for minoritized communities. The key thesis asserts that computing education must transition from a deficit-based approach—one that often focuses on what students lack or are assumed to be incapable of achieving—to a desire-based framework[20, 21]. This shift in perspective prioritizes students' passions, aspirations, and interests, motivating them to use their computing skills to engage with and address real-world problems that directly affect their communities, particularly in the context of racial injustice.

In this approach, students are not only trained to develop technical proficiency, such as mastering coding languages like Python and utilizing data analysis tools like Pandas, but are also encouraged to explore the ethical implications of technology[20, 21]. They are prompted to recognize how data and algorithms can perpetuate systems of oppression. Through engaging in data activism, students are urged to confront issues such as discriminatory data practices, surveillance, and the unequal distribution of resources. This research proposes that when students are empowered to apply their computing skills to issues that matter most to them, they cultivate a stronger sense of agency and responsibility toward their communities. Furthermore, by centering the experiences and voices of African American students, this research argues that computing education can become a transformative tool for social change. It can foster a generation of activists who not only excel in technology but also use it as a means of creating a more just and equitable society. This desire-based approach redefines the role of technology in education, shifting the narrative from merely preparing students for the workforce to empowering them as advocates for systemic change. Additionally, I hope that my empirical data, which reflects the innovative ideas of youth, will lead to the creation of guidelines and influence policy to ensure that African American youth play a leading role in shaping the future of AI and related policy movements.

## 1.4 Research Approach and Methods

**1.4.1 Data Activism as a Tool for Social Change.** The first program engaged 12 high school students of color, while the second expanded to 24 African American high school students who partnered with community organizations in the Greater Boston area. These students worked on a range of data activism projects, including geospatial analysis, qualitative research, surveys, interviews, and artistic expression. The projects addressed social justice issues such as housing insecurity, environmental justice, and racial health disparities.

In my research, I use a combination of qualitative and quantitative methods to explore how African American youth engage with data activism through liberatory computing tools. The primary methods include student surveys, student projects, student interviews, and participant observation. These methods are designed to capture both the cognitive and experiential aspects of students' learning, allowing me to examine how their racial identity, critical consciousness, and activism skills develop through computing education.

The student surveys provide quantitative data on students' perceptions of their knowledge, attitudes, and growth in areas like data science, racial justice, and social activism. Using Likert scale questions, these surveys measure shifts in students' understanding of how data can address systemic inequities and their sense of agency and responsibility toward their communities. By comparing baseline and post-program responses, I can assess the impact of liberatory computing on students' perceptions and self-efficacy.

Student projects allow for qualitative analysis of how students apply racial justice and activism principles to their work. This method helps gauge how well they integrate liberatory computing into practical applications. Through participant observation, I observe students' interactions and learning in real-time, providing valuable insights into their engagement with the curriculum and how they interpret and respond to the material.

Lastly, student interviews offer in-depth qualitative data on students' thoughts and reflections about how the program influences their views on technology and activism. These interviews help me understand how students describe the development of their racial identity, critical consciousness, and activism skills. Interviews also allow me to explore their views on the ethical implications of computing and data science and how these topics shape their sense of justice and responsibility. Together, these methods provide a comprehensive understanding of how African American youth engage with liberatory computing, developing a sense of agency and responsibility. By combining surveys, projects, interviews, and observations, I capture a holistic view of how students are learning, evolving, and using their computing skills to address social justice issues.

### 1.4.2 Community-Driven Computing: A Transformative Approach.

In the Data Activism Curriculum, I incorporate CPAR (Critical Participatory Action Research), a crucial approach that ensures minoritized communities are involved in every phase of AI and data science development[1]. CPAR is a research methodology that emphasizes the involvement of community members as co-researchers, where their lived experiences and knowledge contribute to the research process. This method fosters collaboration between community organizers, activists, and researchers, ensuring that the concerns of historically oppressed groups are addressed and that their voices guide the development of technological solutions.

A key aspect of CPAR in the Data Activism Curriculum is the active participation of community organizers who bring their expertise and understanding of local issues into the curriculum. These collaborations enabled students to connect data science with personal narratives, disrupting traditional narratives in computing education. Community partners—who had expertise in issues such as housing displacement and environmental racism—helped students explore how data could be used to challenge systemic inequities. They have worked with the Vera Institute of Justice to analyze racial disparities in incarceration, AfroPink to address breast cancer inequities, and the Algorithmic Justice League to mitigate AI surveillance bias.

The impact of these collaborations was twofold. First, students gained a deeper understanding of the social justice implications of data, reinforcing their role as agents of change in their communities[20,

21]. Second, the community organizations benefited from student-led data projects that provided critical insights and advocacy tools[20, 21]. For example, students created data visualizations to support policy proposals addressing flooding in African American and low-income Boston neighborhoods. These projects demonstrate that data science, when applied with a justice-oriented approach, can be a powerful tool for advocacy and systemic change.

**1.4.3 Progress on My Research.** I have already gathered extensive empirical data on how African American students engage with data science, particularly in the context of reflexivity, identity development, and activism. This data provides valuable insights into how students navigate and apply data activism principles to address systemic issues. Moving forward, my focus will be on documenting and synthesizing these findings to illustrate the broader impact of liberatory computing. This includes refining my analysis, structuring the results for publication, and ensuring that my research contributes to discussions on justice-centered computing education.

My dedication to ethical AI and algorithmic transparency has earned me recognition through prestigious awards. At the 2022 RESPECT (Research on Equity and Sustained Participation in Engineering) Conference, I won the Best Position Paper Award for my paper titled "Liberatory Computing for African American Students," in which I introduced the term "liberatory computing." [22] This work focused on integrating liberation-centered tools into computing, such as sound racial identity, critical consciousness, collective obligation, liberation-centered academic identity, and activism skills. Additionally, my lesson plan on the COMPAS recidivism algorithm received top honors at the 2023 EAAI (The Symposium on Educational Advances in Artificial Intelligence) [9]. This lesson guided students through a detailed critique of the COMPAS system, highlighting racial disparities in predictive policing and empowering them to develop more fair and accountable alternatives.

## 1.5 Anticipated Timeline

In Fall 2025, I plan to dedicate time to completing the data analysis for my research, carefully reviewing and interpreting the results to ensure they align with my research objectives. During this period, I will refine my findings and ensure the analysis is comprehensive, drawing meaningful insights that support the central themes of my dissertation. By Winter 2026, I will focus on drafting the final chapters of my dissertation, synthesizing the analysis into a cohesive narrative that clearly articulates the contributions of my research to the field. I will also ensure that each chapter is well-organized and rigorously written, addressing all necessary theoretical and empirical aspects. Once the draft is complete, I will submit the final chapters for review and feedback. In Spring 2026, I will prepare for and defend my dissertation, engaging in discussions with my committee members to ensure my research is robust and impactful. Following the successful defense, I will work on publishing the key findings of my research in academic journals and presenting them to broader academic and community audiences to share the significance of my work.

## 1.6 Feedback Request for the Doctoral Consortium

The implications of this work extend beyond individual students, influencing how educators, researchers, and policymakers approach computing education. The traditional approach to computer science education often ignores the ethical and societal implications of technology, leaving students without the critical perspective needed to challenge inequitable systems. This research demonstrates that when students engage with data through a justice-focused lens, they not only develop technical proficiency but also a heightened awareness of how technology can be wielded for both oppression and liberation.

Looking ahead, my goal is to expand this work by collaborating with minority-serving institutions, community-based youth organizations, and global learning networks. I plan to develop an accessible computing curriculum that integrates social justice principles while also refining assessment metrics that measure not only technical skills but also students' growth in critical consciousness. By fostering opportunities for historically excluded students to apply data science to real-world social justice issues, we can create pathways for them to become leaders in ethical AI and data activism. Ultimately, my vision is to cultivate a generation of socially conscious technologists who see data as a powerful tool for liberation rather than oppression. Through continued collaboration with educators, activists, and policymakers, I hope to contribute to a more equitable and just technological future for all.

Since I have already gathered extensive empirical data on how African American students engage with data science, my next step is to document these findings while also reflecting on my own process through autoethnography. I am considering whether to publish this work as a journal article or a book, each offering unique advantages. A journal article would allow for a focused analysis of my methodological approach, the role of reflexivity in computing education, and how my identity has shaped my research. To support this, I am exploring book proposal development opportunities such as Princeton University's Book Proposal Development Grants. As I refine my approach, I aim to contribute both scholarly and practical insights into how computing education can become a tool for social justice and empowerment.

Questions for Feedback:

- (1) How can I refine my assessment metrics to better measure the impact of liberatory computing on students' academic identity and activism skills?
- (2) What strategies can I use to scale my curriculum while maintaining its depth and transformative potential?
- (3) How can I position this research to influence computing education and AI policies at a broader level?
- (4) What are potential venues for publishing and disseminating my findings to maximize their impact within the computing education and social justice communities?

By integrating this feedback, I aim to solidify my contributions to computing education and ensure that my research continues to drive meaningful change in the field.

## References

- [1] Thomas Albright and Gretchen Brion-Meisels (Eds.). 2024. *Critical Thinking on Youth Participatory Action Research: Participation, Power, and Purpose* (1st ed.). Routledge.
- [2] Ruha Benjamin. 2019. *Race After Technology: Abolitionist Tools for the New Jim Code*. PoliPointPress, Chicago, IL. <https://www.politics-prose.com/book/9781642591273>
- [3] E. Dillon and K. L. Williams. 2020. Connecting with Computing: Exploring Black/African-American Women's People-Centered Interests in Computing Sciences. In *2020 Research on Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT)*. Portland, OR, USA, 1–2. doi:10.1109/RESPECT49803.2020.9272447
- [4] Aaliyah El-Amin. 2015. "Until Justice Rolls Down Like Water" Revisiting Emancipatory Schooling for African Americans – a Theoretical Exploration of Concepts for Liberation. Doctoral dissertation. Harvard Graduate School of Education. <https://www.proquest.com/dissertations-theses/until-justice-rolls-down-like-water-revisiting/docview/1694230141/se-2>
- [5] Alex Hanna et al. 2020. Race and Technology: The Intersection of AI and Racial Justice. *Proceedings of the 2020 Conference on Fairness, Accountability, and Transparency* (2020).
- [6] S. T. Jones and N. Melo. 2021. 'Anti-Blackness is no glitch': The need for critical conversations within computer science education. *Journal of Critical Thought and Praxis* 10, 1 (2021), 1–18.
- [7] Yolanda A. Rankin, Sheena Erete, Jakita O. Thomas, and Nichole Pinkard. 2024. The Choice is Yours: Intersectional Studies versus Studies of Intersectional Populations in Computing Education Research. In *Proceedings of the 55th ACM Technical Symposium on Computer Science Education V. 1 (SIGCSE 2024)*. Association for Computing Machinery, New York, NY, USA, 1098–1104. doi:10.1145/3626252.3630942
- [8] Amy J. Ko. 2018. Justice-Centered Computing: A Case for Building More Inclusive and Ethical CS Education. *Commun. ACM* 61, 6 (2018), 38–47.
- [9] Todd W. Neller, Raechel Walker, Olavo Dias, Zeynep Yalçın, Cynthia Breazeal, Matthew Taylor, Marco Donini, Erik J. Talvitie, Chris Pilgrim, Paolo Turrini, John Maher, Matt Boutell, James Wilson, Negar Norouzi, and Jim Scott. 2024. Model AI Assignments 2023. *Proceedings of the AAAI Conference on Artificial Intelligence* 37, 13 (2024), 16104–16105. doi:10.1609/aaai.v37i13.26913
- [10] Safiya Noble. 2018. *Algorithms of Oppression: How Search Engines Reinforce Racism*. NYU Press.
- [11] Ihudiya Finda Ogbonnaya-Ogburu et al. 2020. The Role of Reflexivity in Addressing Racial Inequities in Computing. *Proceedings of the 2020 ACM SIGCSE Technical Symposium on Computer Science Education* (2020).
- [12] Nichole Pinkard, Sheena Erete, Cheryl K. Martin, and Maxine McKinney de Royston. 2017. Digital Youth Divas: Exploring Narrative-Driven Curriculum to Spark Middle School Girls' Interest in Computational Activities. *Journal of the Learning Sciences* 26, 3 (2017), 477–516. doi:10.1080/10508406.2017.1307199
- [13] Yolanda A. Rankin and Jakita O. Thomas. 2020. The Intersectional Experiences of Black Women in Computing. In *Proceedings of the 51st ACM Technical Symposium on Computer Science Education (SIGCSE '20)*. Association for Computing Machinery, New York, NY, USA, 199–205. doi:10.1145/3328778.3366873
- [14] Mia S. Shaw, James Joshua Coleman, Ebony Elizabeth Thomas, and Yasmin B. Kafai. 2023. Restorying a Black girl's future: Using womanist storytelling methodologies to reimagine dominant narratives in computing education. *Journal of the Learning Sciences* 32, 1 (2023), 52–75. doi:10.1080/10508406.2023.2179847
- [15] Eman Sherif, Jayne Everson, F. Megumi Kivuva, Mara Kirdani-Ryan, and Amy J. Ko. 2024. Exploring the Impact of Assessment Policies on Marginalized Students' Experiences in Post-Secondary Programming Courses (ICER '24). Association for Computing Machinery, New York, NY, USA, 233–245. doi:10.1145/3632620.3671100
- [16] F. D. Starks and M. M. Terry. 2024. Critical Love Praxis as Pro-Black Pedagogy: A Literature Synthesis of Empirical Research in K-12 Education. *Journal for Multicultural Education* 18, 3 (2024), 259–274. doi:10.1108/JME-11-2022-0156
- [17] Eve Tuck. 2009. Suspending Damage: A Letter to Communities. *Harvard Educational Review* 79, 3 (2009), 409–427. <https://www.jstor.org/stable/42700664>
- [18] Sepehr Vakil. 2018. Toward a Justice-Centered Approach to Equity in CS Education. *Proceedings of the 2018 ACM Conference on International Computing Education Research* (2018).
- [19] Shirin Vossoughi and Sepehr Vakil. 2018. Toward What Ends? A Critical Analysis of Militarism, Equity, and STEM Education. In *Education at War: The Fight for Students of Color in America's Public Schools*, Arshad Imtiaz Ali and Tracy Lachica Buenavista (Eds.). Fordham University Press, New York, USA, 117–140. doi:10.1515/9780823279111-007
- [20] R. Walker, S. Brady, O. Dias, A. Castillo, K. Asfaw, E. Johnson, M. Taylor, and C. Breazeal. 2024. Unveiling Voices: Boston Students' Data Activism Journey with Community Catalysts. In *Black Issues in Computing Education Symposium 2024*. Santo Domingo, Dominican Republic. <https://www.media.mit.edu/publications/unveiling-voices-boston-students-data-activism-journey-with-community-catalysts/>
- [21] Raechel Walker, Olivia Dias, Matthew Taylor, and Cynthia Breazeal. 2024. Alleviating the Danger Of A Single Story Through Liberatory Computing Education. In *Proceedings of the 2024 on RESPECT Annual Conference (RESPECT 2024)*. Association for Computing Machinery, New York, NY, USA, 169–178. doi:10.1145/3653666.3656072
- [22] Raechel Walker, Eman Sherif, and Cynthia Breazeal. 2022. Liberatory Computing Education for African American Students. In *2022 Conference on Research in Equitable and Sustained Participation in Engineering, Computing, and Technology (RESPECT)*. 95–99. doi:10.1109/RESPECT55273.2022.00024