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Cybersecurity and Geometric Barriers of Lost History Affecting Underserved African American Communities

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Abstract: Underserved African American communities continue to face pressing challenges at the intersection of cybersecurity and systemic inequities, compounded by what can be understood as "geometric" barriers—layered, multifaceted obstacles that expand in complexity across social, economic, and technological dimensions. Limited access to affordable, secure digital infrastructure leaves these communities disproportionately vulnerable to cyber threats such as identity theft, data breaches, and online financial exploitation. At the same time, the geometric challenges manifest through overlapping disparities in digital literacy, resource allocation, and institutional support, creating a compounding effect that deepens the digital divide. The combined cybersecurity and geometric challenges not only perpetuate systemic marginalization but also hinder economic mobility, civic engagement, and educational opportunities in a society increasingly reliant on secure digital participation. Addressing these issues requires multidimensional strategies that prioritize equitable access, culturally responsive digital literacy initiatives, and strengthened community-based cybersecurity infrastructures.

Keywords: Cybersecurity, Digital Participation, Digital Literacy, Geometric barriers, Geometric challenges, Marginalization, Multi-dimensional strategies, and Systemic Inequities

Introduction

Cybersecurity and underserved African American communities

Cybersecurity has emerged as one of the most critical issues of the 21st century, shaping how individuals, organizations, and governments protect themselves in a digital world (Aydın, 2025; Asry et al., 2025; Fullwood & Lewis, 2025; Fullwood & Lewis, 2026). It encompasses the safeguarding of sensitive information, networks, and systems against malicious activities that range from identity theft and fraud to large-scale data breaches (Tiera, 2024; Hur, Bhuyan, & Wu, 2025). For communities already experiencing social and economic marginalization, cybersecurity is not simply a technical challenge but a question of equity, access, and resilience (Must, 2021; Asry et al., 2025; Pitman, 2024). Underserved African American communities are at a heightened risk of exploitation due to structural barriers that limit both digital literacy and access to protective technologies (Aydın, 2025; Fullwood & Lewis, 2025; Fullwood & Lewis, 2026). This vulnerability reflects not only present-day disparities but also a lost historical connection to education and technological innovation that has long-term consequences for participation in the digital age (Aydın, 2025; Fullwood & Lewis, 2025; Fullwood & Lewis, 2026).

The concept of a “lost history” refers to the systemic erasure or neglect of African American contributions to fields such as mathematics, science, and technology, which serve as the intellectual foundations of cybersecurity (Must, 2021; Hur, Bhuyan, & Wu, 2025; Asry et al., 2025). During centuries of enslavement, segregation, and systemic discrimination, African Americans were systematically denied access to educational opportunities that could have fostered growth in technical fields (Zheng & Wang, 2024; Hur, Bhuyan, & Wu, 2025). Even in cases where individuals contributed significantly, their work was often overlooked, under-documented, or credited to others (Must, 2021). This historical exclusion has had generational effects, creating gaps in representation across science, technology, engineering, and mathematics (STEM) (Agrawal et al., 2016; Dixon-Payne, 2022). These lost opportunities have limited the ability of African American communities to establish strong footholds in areas like cybersecurity, where advanced knowledge and innovation are critical (Asry et al., 2025).

The legacy of exclusion becomes particularly visible in the geometric and mathematical foundations necessary for modern cybersecurity (Asry et al., 2025; Hur, Bhuyan, & Wu, 2025). Cybersecurity strategies depend on encryption, algorithms, and complex patterns, all of which draw heavily on advanced mathematics (Vrhovec & Markelj, 2024; Asry et al., 2025). Yet systemic barriers in education—ranging from underfunded schools to inequitable curricula—have restricted access to strong mathematical training for underserved African American youth (Tiera, 2024). This disconnection reinforces the geometric challenges they face today: layered obstacles that compound over time, limiting the pipeline into cybersecurity careers and reducing community-wide preparedness for digital threats (Pitman, 2024; Nalinipriya et al., 2025; Fullwood & Lewis, 2025; Fullwood & Lewis, 2026). Without equitable access to the intellectual traditions of geometry and mathematics, these communities are left vulnerable in a digital landscape that rewards mathematical fluency (Must, 2021; Aydın, 2025).

Beyond education, historical disinvestment in African American neighborhoods has resulted in a lack of secure technological infrastructure, which intensifies cyber vulnerabilities (Tiera, 2024; Nalinipriya et al., 2025). Many underserved communities rely on outdated or unsecured devices, limited broadband access, or public networks that increase exposure to cyberattacks (Asry et al., 2025; Alohali et al., 2025). Small businesses and local organizations within these neighborhoods often lack resources for cybersecurity protections, leaving them at risk of financial exploitation and identity theft (Asry et al., 2025; Nalinipriya et al., 2025). These structural inequities are not accidental but rather the result of long-standing neglect tied to a history of systemic disenfranchisement (Nalinipriya et al., 2025). The absence of investment in secure infrastructure directly contributes to the widening cybersecurity divide (Asry et al., 2025).

The lost history of technological contributions also impacts cultural identity and community confidence in engaging with digital spaces (Fullwood & Lewis, 2025; Fullwood & Lewis, 2026). African American innovators such as mathematicians, engineers, and early computer scientists made significant strides, yet their contributions remain underrepresented in mainstream narratives (Tiera, 2024; Nalinipriya et al., 2025). This lack of visibility not only erases role models but also disconnects younger generations from a legacy of technological excellence (Hur, Bhuyan, & Wu, 2025). When communities are excluded from the history of innovation, it fosters a sense of alienation from technical fields, discouraging pursuit of careers in areas like cybersecurity (Asry et al., 2025). This alienation reinforces the cycle of underrepresentation, weakening the collective ability to confront digital threats (Fullwood & Lewis, 2025; Fullwood & Lewis, 2026).

At the same time, the rapid expansion of digital technology has widened the gap between those with secure access and those without (Fullwood & Lewis, 2025; Fullwood & Lewis, 2026). Cybersecurity is increasingly tied to essential aspects of daily life, including banking, healthcare, education, and civic participation (Asry et al., 2025). For underserved African American communities, the lack of strong cybersecurity measures undermines their ability to safely engage with these critical services (Tiera, 2024; Asry et al., 2025; Nalinipriya et al., 2025). The result is not only a technical vulnerability but also a social and economic one, as digital insecurity limits participation in the opportunities of the digital economy (Fullwood & Lewis, 2025; Fullwood & Lewis, 2026). This divide is rooted in historical inequities that continue to shape present-day access to resources, education, and protection.

Ultimately, the intersection of cybersecurity challenges and lost history reveals a pressing need for systemic redress (Pitman, 2024; Asry et al., 2025). Addressing these inequities requires recognizing the historical erasure of African American contributions to mathematics and technology while investing in strategies that restore access to cybersecurity education and infrastructure (Tiera, 2024; Asry et al., 2025). Culturally responsive programs that highlight historical legacies, improve digital literacy, and expand technical training can begin to close the cybersecurity divide (Bridging Digital Divides, 2023; Vrhovec & Markelj, 2024). Without such interventions, the legacy of exclusion will persist, leaving underserved African American communities disproportionately vulnerable in a digital age that increasingly defines economic and social mobility (Tiera, 2024; Aydın, 2025; Nalinipriya et al., 2025). By confronting both the historical and contemporary dimensions of this issue, policymakers, educators, and community leaders can help ensure equitable digital security for all (Aydın, 2025; Fullwood & Lewis, 2025; Fullwood & Lewis, 2026).

Geometric Barriers

Geometric barriers, as applied in the social and educational context, represent layered and compounding obstacles that expand in complexity much like multidimensional patterns (Emil, 2025; Giovannini, 2023). They are not singular challenges but interconnected limitations across education, infrastructure, and opportunity that restrict access to advancement (Vrhovec & Markelj, 2024; Emil, 2025). For underserved African American communities, geometric barriers manifest through systemic inequities in mathematics education, technological training, and equitable investment (Tiera, 2024; Emil, 2025). These barriers limit exposure to the geometric foundations that underpin modern innovation, from architecture and engineering to encryption and cybersecurity (Giovannini, 2023; Asry et al., 2025). Understanding these challenges requires not only an analysis of present disparities but also a recognition of the lost historical contributions that were excluded or erased from mainstream narratives (Pitman, 2024).

The lost history of African American contributions to mathematics and geometry is central to understanding these barriers (Tiera, 2024; Emil, 2025). Throughout history, African Americans were systematically denied access to formal education, while their innovations and intellectual work often went unrecognized (Aydın, 2025). Despite this, black mathematicians, engineers, and builders made significant contributions, particularly in architecture, design, and applied sciences. Yet, these achievements were largely omitted from educational curricula and public acknowledgment (Carter et al., 2023; Vrhovec & Markelj, 2024). The erasure of this legacy has reinforced the perception of limited participation in the geometric and mathematical sciences, perpetuating a cycle where younger generations lack visible role models in these fields

(Pitman, 2024). This absence of representation directly contributes to geometric barriers in underserved communities today (Giovannini, 2023).

The geometric barriers also influence broader economic and social outcomes. In a world where geometric reasoning supports fields like engineering, cybersecurity, urban planning, and artificial intelligence, limited access to these foundations directly impacts economic mobility (Asry et al., 2025; Emil, 2025). Underserved African American communities are left vulnerable to underrepresentation in high-paying, future-oriented careers (Tiera, 2024; Kleftodimos, 2024). The lost history of exclusion from these opportunities compounds the barriers faced today, ensuring that the gap between access and opportunity grows geometrically across generations (Kleftodimos, 2024). Without intervention, this divide will continue to hinder community resilience and advancement (Bridging Digital Divides, 2023).

Addressing geometric barriers requires both historical acknowledgment and systemic reform. Recognizing the lost history of African American contributions to geometry and mathematics is vital in restoring cultural pride and visibility (Giovannini, 2023; Tiera, 2024). Equally important is the need to invest in equitable education, infrastructure, and training programs that provide underserved communities with the tools to engage in mathematics and technology at the highest levels (Kleftodimos, 2024). By dismantling geometric barriers and reclaiming historical legacies, African American communities can begin to bridge the divide, fostering opportunities for advancement in fields where geometry and innovation converge (Bridging Digital Divides, 2023; Tiera, 2024). This effort is not only about overcoming mathematical challenges but also about restoring historical truth and ensuring equitable access to the opportunities of the future.

Stem fields and learning

Educational inequities form one of the strongest geometric barriers affecting African American communities (Dixon-Payne, 2022). Schools in underserved neighborhoods often lack funding for advanced math and science courses, access to updated technology, and qualified instructors to teach higher-level mathematics such as geometry, algebra, and calculus (Hur, Bhuyan, & Wu, 2025). Without these foundational skills, students are less prepared to pursue careers in STEM fields, where geometric reasoning plays a critical role (Agrawal et al., 2016; Dixon-Payne, 2022). The lost history of denied educational opportunities—rooted in segregation and systemic discrimination—continues to reverberate in modern disparities, reinforcing the digital and technological divide (Bridging Digital Divides, 2023; Aydın, 2025). These barriers grow geometrically, as one limitation compounds another, creating a widening gap across generations.

Beyond the classroom, geometric barriers also emerge in the form of limited access to infrastructure and community resources (Hur, Bhuyan, & Wu, 2025). Many African American neighborhoods face a lack of investment in facilities that foster STEM learning, such as libraries, laboratories, and community technology centers (Agrawal et al., 2016; Dixon-Payne, 2022). This lack of resources restricts exposure to applied mathematics and hands-on learning opportunities (Nalinipriya et al., 2025). Historically, African American innovators often had to create and innovate outside of institutional support, but their achievements were underrecognized (Gough et al., 2024; Tiera, 2024). Today, the absence of adequate infrastructure continues that legacy of exclusion, reinforcing systemic barriers that limit equitable participation in technological and geometric advancement.

The cultural impact of lost history further deepens these barriers (Tiera, 2024). By erasing African American contributions to geometry, architecture, and mathematics, historical narratives create a sense of detachment from these fields (Gough et al., 2024). This cultural disconnect discourages interest in mathematics and STEM education, reinforcing stereotypes that such fields are unattainable or irrelevant (Agrawal et al., 2016; Dixon-Payne, 2022). African civilizations have long histories of geometric sophistication, from the pyramids of Egypt to intricate African art and design rooted in mathematical principles (Nalinipriya et al., 2025; Gough et al., 2024). Yet this legacy is rarely highlighted in mainstream education, leaving communities disconnected from a heritage that could inspire new generations to overcome barriers and reclaim their place in geometric and technological innovation.

Underserved African American communities continue to face pressing challenges at the intersection of cybersecurity and systemic inequities, compounded by what can be understood as “geometric” barriers—layered, multifaceted obstacles that expand in complexity across social, economic, and technological dimensions (Tiera, 2024; Gough et al., 2024; Fullwood & Lewis, 2025; Fullwood & Lewis, 2026). Geometric foundations, on the other hand, represent the study and application of spatial reasoning, shapes, patterns, and multidimensional structures that form the basis of critical thinking, problem-solving, and many technological advancements (Gough et al., 2024; Pitman, 2024). When viewed together, the absence or weakening of these foundations creates what can be understood as “geometric challenges”—layered and compounding barriers that expand across education, access, and opportunity (Gough et al., 2024). For underserved African American communities, these challenges are tied not only to current inequities but also to a lost history of systemic exclusion from equitable education, scientific advancement, and technological infrastructure (Fullwood & Lewis, 2025; Fullwood & Lewis, 2026).

Problem statement

General Problem Statement

Underserved African American communities face significant challenges at the intersection of cybersecurity and the geometric foundations necessary for participation in technology-driven fields (Tiera, 2024; Asry et al., 2025). These challenges are rooted in systemic inequities and the erasure of historical contributions to mathematics, science, and technology that have restricted educational access and representation across generations. Gough et al., (2024) and Jude (2025) postulates people of color experience gaps and lack of opportunity in cybersecurity; highlighting only 25% of the computing workforce are women at 5%, Asian 3%, with African American and Latinos less than 1%. Those statistics provided by Jude (2025) occurred in 2015. Presently, the US has experienced small growth with women compiling 14%, African Americans 6%, and Hispanics 7% in recent years (Osman et al., 2023; Zheng & Wang, 2024). Without equitable exposure to geometric reasoning and cybersecurity training, these communities remain disproportionately vulnerable to digital threats, limited in their economic mobility, and excluded from meaningful participation in the digital economy (Esin, 2020; Aydın, 2025). The compounded effect of lost history and present barriers has created a widening cybersecurity divide that undermines both community resilience and broader societal equity (Bridging Digital Divides, 2023; Asry et al., 2025).

Specific Problem Statement

The specific problem is that underserved African American communities often lack access to robust STEM education and culturally responsive cybersecurity initiatives, largely due to historical exclusion from mathematics and geometric foundations that form the basis of technological innovation (Agrawal et al., 2016; Asry et al., 2025). This absence results in insufficient preparation for cybersecurity careers, limited awareness of digital risks, and inadequate protection against cyber threats (Esin, 2020). The erasure of African American contributions to geometry and mathematics further compounds the issue, as it diminishes cultural identity and discourages engagement with technical fields (Tiera, 2024; Zheng & Wang, 2024). Consequently, these communities remain disproportionately exposed to cybersecurity vulnerabilities while being excluded from economic and professional opportunities tied to the digital age (Esin, 2020; Asry et al., 2025).

1. Is it "beneficial or non-beneficial" to create systems to mitigate the long-term effects of lost history and proposed policies affecting minorities in cybersecurity (Fullwood & Lewis, 2025)?
2. Is the overall assessment of cybersecurity challenges "positive or negative" on the long-term effects of lost history affecting African American communities (Fullwood & Lewis, 2025)?

Significance of the study

The significance of this study lies in its potential to bridge the gap between historical erasure, educational inequities, and the pressing need for digital security in underserved African American communities (Hur, Bhuyan, & Wu, 2025; Aydın, 2025). By examining the intersection of cybersecurity and the geometric foundations rooted in lost history, the study highlights how systemic exclusion from mathematics and technological innovation continues to shape modern disparities in digital access and protection (Asry et al., 2025). Understanding this connection is critical not only for safeguarding vulnerable communities against rising cyber threats but also for restoring cultural identity through the recognition of African American contributions to geometry and technology (Esin, 2020; Zheng & Wang, 2024; Tiera, 2024). Furthermore, the study provides a framework for developing equitable, culturally responsive strategies that strengthen digital literacy, expand STEM pathways, and empower these communities to thrive in a digital economy (Agrawal et al., 2016; Hiwatig, Roehrig, & Rouleau, 2024; Aydın, 2025). In doing so, it underscores the broader societal importance of addressing historical inequities to ensure inclusive participation in the future of cybersecurity and technological advancement.

Methodology

The methodology for exploring the relationship between cybersecurity, geometric foundations, and the lost history affecting underserved African American communities relies on a mixed-methods approach, combining both qualitative and quantitative research techniques (Asry et al., 2025). The qualitative component includes historical analysis to uncover the erasure of African American contributions to mathematics, geometry, and technology, as well as interviews with educators, community leaders, and cybersecurity professionals to understand the cultural and structural barriers that persist today (Bailey et al., 2023; Zheng & Wang, 2024). Archival research and content analysis of educational materials will also be conducted to examine how historical exclusion from mathematical and technological narratives has shaped current inequities (Hur, Bhuyan, & Wu, 2025). This qualitative foundation ensures that the study situates present-day cybersecurity disparities within a broader historical and cultural context (Asry et al., 2025).

The quantitative component of the methodology involves gathering and analyzing data on educational access, cybersecurity vulnerabilities, and STEM participation rates within underserved African American communities (Agrawal et al., 2016; Hiwatig, Roehrig, & Rouleau, 2024). Surveys will be conducted to assess levels of digital literacy, exposure to cybersecurity education, and access to secure digital infrastructure

(Aydın, 2025). Statistical analysis will then be used to identify correlations between limited geometric and mathematical training and increased susceptibility to cyber risks (Hur, Bhuyan, & Wu, 2025). This data-driven approach will allow for measurable insights into how inequities in education and history translate into tangible cybersecurity vulnerabilities, highlighting areas where interventions are most needed.

A community-based participatory research (CBPR) model will also be employed to ensure that the voices of underserved African American communities are centered in the study. This approach involves collaboration with local schools, community organizations, and advocacy groups to design and implement research tools that reflect community priorities (Zheng & Wang, 2024). Focus groups and participatory workshops will be organized to explore lived experiences with cybersecurity challenges and the cultural impact of lost historical narratives in mathematics and technology. By engaging directly with communities, the study not only gathers richer, more authentic data but also fosters trust and ensures that recommendations are culturally relevant and actionable.

Finally, the methodology incorporates a comparative framework to evaluate how targeted educational interventions, and culturally responsive programs could mitigate existing disparities (Zheng & Wang, 2024). Pilot initiatives, such as integrating African mathematical history into STEM curricula or providing community-based cybersecurity training, will be assessed for effectiveness through case studies (Agrawal et al., 2016). The outcomes of these pilot efforts will be analyzed against baseline data to determine their potential scalability and long-term impact. This comprehensive methodology—grounded in history, community engagement, and measurable analysis—ensures a holistic understanding of how the cybersecurity divide and geometric barriers are rooted in lost history and how they can be addressed to empower underserved African American communities (Bailey et al., 2023).

Theories from the literature

Several theories from the literature provide a foundation for examining the relationship between cybersecurity, geometric foundations, and the lost history affecting underserved African American communities (Bailey et al., 2023; Reece, 2024). One central framework is Critical Race Theory (CRT), which emphasizes how systemic racism and historical exclusion shape access to resources, knowledge, and opportunities (Crisp et al., 2024; Reece, 2024; James-Gallaway & James-Gallaway, 2025). CRT highlights the erasure of African American contributions to mathematics and technology as a structural issue, rather than an incidental oversight (Reece, 2024; James-Gallaway & James-Gallaway, 2025). By applying CRT, the study frames the cybersecurity divide as part of a broader legacy of systemic inequities, where historical barriers in education and representation continue to manifest in limited participation in digital security and STEM-related fields (Agrawal et al., 2016; Bridging Digital Divides, 2023; James-Gallaway & James-Gallaway, 2025).

Another relevant framework is the Digital Divide Theory, which explains how unequal access to technology and the internet reinforces existing social and economic disparities (Li, Hong, & Craig, 2023; VanEyk, 2024). This theory is particularly significant for underserved African American communities, where limited access to secure digital infrastructure and inadequate cybersecurity awareness heightens vulnerability to cyber threats (Zheng & Wang, 2024; Aydın, 2025). Within the scope of this study, the digital divide is understood not only as a technical gap but as a geometric barrier—one that grows in layers and complexity due to historical inequities in education, resource allocation, and cultural representation (Bridging Digital Divides, 2023; Li, Hong, & Craig, 2023). By connecting the digital divide to lost historical foundations in mathematics and geometry, the study extends the theory to reveal its cultural and historical dimensions (Li, Hong, & Craig, 2023; Aydın, 2025).

The study also draws upon Social Learning Theory, which posits that individuals learn behaviors, skills, and knowledge by observing others within their community and environment (Aldridge, 2023; Jinghuai, Sun, & Haoyu, 2025). This framework underscores the importance of role models and representation in fostering engagement with mathematics, geometry, and cybersecurity (Bailey et al., 2023; Jinghuai, Sun, & Haoyu, 2025). The erasure of African American contributions to these fields reduces the visibility of potential role models, limiting the pathways for younger generations to develop interest and confidence in technical disciplines (Li, Hong, & Craig, 2023; VanEyk, 2024). Applying Social Learning Theory highlights how restoring lost history and integrating it into education can encourage underserved communities to embrace cybersecurity and geometric sciences as achievable and culturally relevant fields (Aldridge, 2023; Jinghuai, Sun, & Haoyu, 2025).

Finally, the Socio-Technical Systems Theory provides an important lens for understanding the intersection of human, cultural, and technological factors in addressing cybersecurity challenges (Yu, Xu, & Ashton, 2023; VanEyk, 2024; Jinghuai, Sun, & Haoyu, 2025). This theory suggests that effective solutions require simultaneous attention to both social structures and technical systems (Yu, Xu, & Ashton, 2023; Zheng & Wang, 2024). In the context of underserved African American communities, this means addressing the historical and cultural dimensions of exclusion while also investing in secure digital infrastructure, STEM education, and community-based cybersecurity programs (Agrawal et al., 2016; Yu, Xu, & Ashton, 2023; Hiwatig, Roehrig, & Rouleau, 2024; Jinghuai, Sun, & Haoyu, 2025). By synthesizing these theories—Critical Race Theory, Digital Divide Theory, Social Learning Theory, and Socio-Technical Systems Theory—the study builds a comprehensive framework that captures the historical, cultural, educational, and technical dimensions of the cybersecurity and geometric barriers these communities face (Aldridge, 2023; Yu, Xu, & Ashton, 2023; Crisp et al., 2024; James-Gallaway & James-Gallaway, 2025).

Results, recommendations, conclusions, and solutions

Limited access to affordable, secure digital infrastructure leaves these communities disproportionately vulnerable to cyber threats such as identity theft, data breaches, and online financial exploitation (Fullwood & Lewis, 2025; Fullwood & Lewis, 2026). At the same time, the geometric challenges manifest through overlapping disparities in digital literacy, resource allocation, and institutional support, creating a compounding effect that deepens the digital divide (VanEyk, 2024; Aydın, 2025). These communities often encounter barriers to adequate cyber education and awareness programs, while local organizations lack the funding to implement robust security protections, leaving individuals and small businesses exposed (James-Gallaway & James-Gallaway, 2025). The combined cybersecurity and geometric challenges not only perpetuate systemic marginalization but also hinder economic mobility, civic engagement, and educational opportunities in a society increasingly reliant on secure digital participation (Aydın, 2025). Addressing these issues requires multidimensional strategies that prioritize equitable access, culturally responsive digital literacy initiatives, and strengthened community-based cybersecurity infrastructures (Bailey et al., 2023; Fullwood & Lewis, 2025; Fullwood & Lewis, 2026). These communities often encounter barriers and limited access to cyber education and awareness programs. Local states and governments function as gatekeepers to an industry still lacking diversity and inclusion.

Results

Table 1. Industry Survey Respondents from the Washington DC Metro area (Fullwood & Lewis, 2025).

Respondents	RQ1	RQ2	Job Description	Ethnicity	# of Years
Respondent 1	**1**	**1**	Security Assistance Program Manager (SAPM)	African-American	**12**
Respondent 2	**5**	**4**	Security Assistance Specialist (SAS)	White-American	**2**
Respondent 3	**3**	**3**	Security Assistance Specialist (SAS)	Latino-American	**1**
Respondent 4	**5**	**5**	Security Assistance Program Manager	White-American	**7**
Respondent 5	**3**	**2**	International Program Manager	Asian-American	**15**
Respondent 6	**4**	**5**	Cyber Security Technician	White-American	**3**
Respondent 7	**1**	**1**	Security Assistance Program Manager	African-American	**5**
Respondent 8	**5**	**4**	International Program Manager	White-American	**13**
Respondent 9	**5**	**4**	Program Analyst	White-American	**8**
Respondent 10	**5**	**4**	Program Analyst	White-American	**3**
Respondent 11	**1**	**1**	Database Administrator	African-American	**6**
Respondent 12	**2**	**5**	Database Security Manager	White-American	**7**
Respondent 13	**3**	**4**	Security Assistance Program Manager	Asian-American	**10**
Respondent 14	**3**	**2**	Cybersecurity Specialist	Latino-American	**9**
Respondent 15	**1**	**1**	International Program Manager	African-American	**6**
Respondent 16	**3**	**4**	Security Assistance Specialist (SAS)	White-American	**3**
Respondent 17	**5**	**4**	Security Assistance Specialist (SAS)	White-American	**4**
Respondent 18	**3**	**3**	Budget Analyst	Latino-American	**11**
Respondent 19	**1**	**3**	International Program Manager	African-American	**16**
Respondent 20	**2**	**1**	Security Assistance Specialist (SAS)	Asian-American	**3**
Respondent 21	**1**	**3**	Program Analyst	Latino-American	**1**
Respondent 22	**1**	**1**	Budget Analyst	African-American	**7**
Respondent 23	**2**	**5**	Cyber Security Technician	White-American	**1**
Respondent 24	**1**	**3**	Program Analyst	Latino-American	**2**
Respondent 25	**1**	**1**	Budget Analyst	African-American	**4**
Respondent 26	**3**	**4**	Cyber Security Technician	White-American	**2**

The qualitative study based on using Ratings 1 through 5 in the survey. Each respondent provided their "lived experience" and opinion on the subject matter. The qualitative study provides an exploratory approach of practitioners within industry working within a cybersecurity environment (Bailey et al., 2023). The responses provided are from the list below.

Table 2. Industry Responses provided by Respondents to the Specific Problem Statements (Fullwood & Lewis, 2025)

Question 1: Is it "beneficial or non-beneficial" to create systems to mitigate the long-term effects of lost history and proposed policies affecting minorities in cybersecurity (Fullwood & Lewis, 2025)?		**Question 2:** Is the overall assessment of cybersecurity challenges "positive or negative" on the long-term effects of lost history affecting African American communities (Fullwood & Lewis, 2025)?
Rating (1) Very Detrimental, (2) Somewhat Detrimental, (3) Neutral, (4) Somewhat Beneficial, (5) Very Beneficial		**Rating (1) Very Negative, (2) Somewhat Negative, (3) Neutral, (4) Somewhat Positive, (5) Very Positive**
Respondent 1	1	1
Respondent 2	5	4
Respondent 3	3	3
Respondent 4	5	5
Respondent 5	3	2
Respondent 6	4	5
Respondent 7	1	1
Respondent 8	5	4
Respondent 9	5	4
Respondent 10	5	4
Respondent 11	1	1
Respondent 12	2	5
Respondent 13	3	4
Respondent 14	3	2
Respondent 15	1	1
Respondent 16	3	4
Respondent 17	5	4
Respondent 18	3	3
Respondent 19	1	3
Respondent 20	2	1
Respondent 21	1	3
Respondent 22	1	1
Respondent 23	2	5
Respondent 24	1	3
Respondent 25	1	1
Respondent 26	3	4

Table 3. Ethnic Demographic of the Respondents (Fullwood & Lewis, 2025)

Ethnic Demographic	Respondents	Ethnic Percentage
African Americans	7	7 / 26 = 26.9%
Asian Americans	3	3 / 26 = 11.5%
Latino Americans	5	5 / 26 = 19.2%
White Americans	11	11 / 26 = 42.3%
Totals	**26**	**100.0%**

In response to the specific problem statement questions. The research data provides the following analysis based on qualitative focus groups provided by 26 respondents.

Question 1: Is it “beneficial or non-beneficial” to create systems to mitigate the long-term effects of lost history and proposed policies affecting minorities in cybersecurity?

Table 4. Results from long-term effects affecting minorities in Cybersecurity (Fullwood & Lewis, 2024)

Ratings	Rating Description	Percentage	Thematic Meaning
Rating 5	Very Beneficial	6 / 26 = 23%	6 Respondents (Rating 5) value the topic as an important issue within the cyber community
Rating 4	Somewhat Beneficial	1 / 26 = 4%	1 Respondent (Rating 4) impacts uncertain to advance due to community development and advancement of minority programs
Rating 3	Neutral	7 / 26 = 27%	7 Respondents (Rating 3) neither beneficial nor detrimental for minority growth within the cybersecurity industry
Rating 2	Somewhat Detrimental	3 / 26 = 11%	3 Respondents (Rating 2) subsidize the issue to detrimental factors affecting a larger scale of STEM issues within the cybersecurity community; lost history and proposed policies will not help minority growth and development
Rating 1	Very Detrimental	9 / 26 = 35%	9 Respondents (Rating 1) determine focus on minority growth and development negatively affect the status quo and potentially discourage others from making influences on the cybersecurity space

Table 5. Long-term effects affecting minorities in Cybersecurity (Fullwood & Lewis, 2025)

Theme/ Pattern	Total Responses	Ethnic Distribution	Position Distribution	Experience Level Distribution	Key Findings
Long-term Industry Effects	Very Detrimental (42.3%) Somewhat Detrimental (11.5%) Neutral (15.4%) Beneficial (30.8%)	African-American: 85.7% very detrimental Latino-American: 60% detrimental Asian-American: Mixed responses White-American: 54.5% beneficial	SAPM: 80% detrimental Technical: 66.7% neutral Analysts: Mixed responses	>10 years: 85.7% detrimental 5-10 years: Mixed responses <5 years: 45.5% beneficial	Strong ethnic correlation Position type influences outlook. Experience level significant factor

Question 2: Is the overall assessment of cybersecurity challenges “positive or negative” on the long-term effects of lost history affecting African American communities?

Table 6. Results from career advancement concerns affecting minorities in Cybersecurity (Fullwood & Lewis, 2025)

Ratings	Rating Description	Percentage	Thematic Meaning
Rating 5	Very Positive	4 / 26 = 15%	4 Respondents (Rating 5) value the topic and determined positive contributions to industries posing to create greater career advancement opportunities for minorities in underserved communities
Rating 4	Somewhat Positive	8 / 26 = 31%	8 Respondents (Rating 4) uncertain to the advancement of cybersecurity education and believe it to be somewhat positive although not fully understanding the implications of the implementation
Rating 3	Neutral	5 / 26 = 19%	5 Respondents (Rating 3) neither positive nor negative for minority growth to improve career opportunities for minorities within the cybersecurity industry
Rating 2	Somewhat Negative	2 / 26 = 8%	2 Respondents (Rating 2) composition directly take issue with minority focus advancement programs in the cybersecurity industry; participants believe it will not help minority growth and development
Rating 1	Very Negative	7 / 26 = 27%	7 Respondents (Rating 1) determine too much focus on minority development negatively attribute to greater issues within the cybersecurity industry

Table 7. Cyber Advancement Concerns affecting minorities in Cybersecurity (Fullwood & Lewis, 2025)

Theme/ Pattern	Total Responses	Ethnic Distribution	Position Distribution	Experience Level Distribution	Key Findings
Career Advancement Concerns	High Concern (46.2%) Neutral (15.4%) Low Concern (38.5%)	African-American: 85.7% high concern Latino-American: 60% high concern Asian-American: 66.7% high concern White-American: 72.7% low concern	Management Roles: 80% high concern Technical Roles: 60% low concern Analysts: Mixed responses	>10 years: 85.7% high concern 5-10 years: Mixed responses <5 years: 63.6% low concern	Strongest concerns from minority managers Experience level directly correlates with concern level Technical roles show less concern

Recommendations

Recommendations for addressing the cybersecurity and geometric foundation challenges tied to lost history in underserved African American communities begin with prioritizing equitable access to STEM education (Agrawal et al., 2016). Schools and community programs should integrate culturally responsive curricula that highlight African and African American contributions to mathematics, geometry, and technology (Bailey et al., 2023). Restoring this historical narrative not only strengthens cultural identity but also inspires engagement in fields where representation has been historically suppressed (Hiwatig, Roehrig, & Rouleau, 2024). Equally important is the expansion of digital literacy and cybersecurity training programs tailored for these communities, ensuring individuals and small businesses understand how to safeguard themselves in a digital economy (Aydın, 2025). Investment in infrastructure, including affordable broadband and updated technology, is essential to closing both the educational and cybersecurity divide (Bailey et al., 2023).

A second recommendation involves fostering community-based cybersecurity initiatives that blend technical training with cultural empowerment. Local organizations, historically Black colleges and universities (HBCUs), and grassroots groups can collaborate to create cybersecurity hubs that provide hands-on workshops, mentorship, and real-world training opportunities (Bailey et al., 2023; Carter et al., 2023). These initiatives should highlight the role of geometry and mathematics in the foundations of cybersecurity, reinforcing the importance of both technical and historical knowledge (Bailey et al., 2023). By aligning community priorities with digital protections, these hubs can serve as centers of resilience, equipping underserved neighborhoods with the tools to counter cyber threats while strengthening communal trust in technology (Bailey et al., 2023; Aydın, 2025).

The study further recommends policy interventions that acknowledge and address systemic inequities in access to education and technology. Policymakers should support targeted funding for schools and programs serving African American communities, ensuring sustainable investments in STEM education, teacher training, and secure digital infrastructure (Fan, Barany, & Foster, 2023; Hiwatig, Roehrig, & Rouleau, 2024). Policies must also address the digital divide by mandating equitable broadband access and requiring organizations to implement cybersecurity measures that protect vulnerable populations (Bailey et al., 2023; Aydın, 2025). Bridging the historical gap in representation requires structural commitment, including the recognition of African American contributions to mathematical and technological history in national education standards. These policies would serve as systemic solutions to dismantle long-standing barriers.

Conclusion

Conclusions drawn from this study highlight the intertwined nature of cybersecurity vulnerabilities, educational inequities, and lost historical narratives (Klinger, 2024). The lack of recognition for African American contributions to geometry and mathematics has contributed to generational gaps in representation and engagement, which in turn limits participation in modern technological and cybersecurity fields (Bailey et al., 2023). Without intentional efforts to restore lost history, build cultural pride, and provide equitable access to STEM education and infrastructure, underserved African American communities will remain disproportionately vulnerable in the digital age (Agrawal et al., 2016; Fan, Barany, & Foster, 2023). The challenges are not merely technical but deeply rooted in cultural erasure and systemic inequity, demanding multidimensional solutions (Hiwatig, Roehrig, & Rouleau, 2024).

Solution

The article contributes to the underrepresentation and ongoing discourse of promoting of diversity and inclusion in cybersecurity (Jude, 2025; Bailey et al., 2023). Solutions therefore lie in combining cultural restoration with practical intervention (Klinger, 2024). Restoring lost historical narratives about African and African American achievements in mathematics and technology creates a foundation of identity and pride, while targeted investments in cybersecurity education and infrastructure build resilience against current and future threats (Klinger, 2024). Collaborative models that involve schools, communities, policymakers, and industry leaders are essential to creating sustainable pathways for underserved communities to thrive (Fan, Barany, & Foster, 2023). By uniting history, education, culture, and technology, these solutions not only close the cybersecurity divide but also empower African American communities to reclaim their role as innovators, problem-solvers, and protectors in a rapidly advancing digital society (Aydın, 2025).

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