



Information Research – Vol. 31 No. ISIC (2026)

Information behaviour as a framework for exploring STEM participation of Black women

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DOI: <https://doi.org/10.47989/ir31ISIC65243>

Abstract

Introduction. The underrepresentation of minority groups in STEM fields has generated substantial research aimed at increasing participation across diverse populations. However, limited attention has been given to the information practices of Black women in STEM fields. This short paper introduces a framework for examining the experiences of Black women in Science, Technology, Engineering, and Mathematics (STEM) fields through the lens of information behaviour.

Method. Elements of Wilson's 1981 model of information behaviour, intersectionality theory, and critical race theory are integrated in developing a research model.

Result. The conceptual framework illustrates the intersection of information behaviour with key variables of race and gender studies and describes the relationship among them.

Conclusion. Integrating an information behaviour framework with critical race and intersectionality theories enables a holistic inquiry into the lived experiences of the marginalised by revealing hidden inequities and biases in social structures and information systems.

Introduction

Black women remain grossly underrepresented in Science, Technology, Engineering, and Mathematics (STEM) fields (Alfred, Ray & Johnson, 2019; Ferguson & Martin-Dunlop, 2021). Prior research has explored various dimensions of this marginalization in the context of the influence of intersecting identities (Charleston, Adserias, Lang & Jackson, 2014; Allen, Dancy, Stearns, Mickelson & Bottia, 2022), role of mentors (Dickens, Ellis & Hall, 2021), resilience (Dickens & Hall, 2024), and structural and institutional inequalities (Casad, Franks, Garasky, Kittleman, Roesler, Hall, & Petzel, 2021). Despite these insights, limited attention has been given to Black women's information behaviour, that is, how they access, retrieve, use, and transfer information across traditional contexts (e.g., digital platforms, libraries) and non-traditional spaces (e.g., friends, families, communities).

Early work by Chatman (1996) on *outsiders* highlights how information-poor individuals adapt information practices within small worlds. Advancing this perspective, Gibson and Martin (2019) shift focus from these individuals' behaviour to the social and institutional systems that produce information marginalization through intersecting identities of race and gender. Black women in STEM are crucial information users who experience exclusion and marginalisation at multiple levels due to their intersecting race and gender identities. This necessitates a need to examine how their information practices shape participation and representation in STEM fields within social, institutional, and digital systems.

Information behaviour, often interchangeably used with information practices or information seeking, examines how people interact with the world and engage with information across technologies and media (Given et al., 2023). It is any form of communication with people through different information sources and the receiving of information in diverse formats (Wilson, 2022). By focusing on everyday practices, information behaviour illuminates how people make sense of their environments, satisfy needs, and navigate challenges (Bates, 2010; Ocepek, 2018). As a marginalized group, Black women in STEM (along with other underrepresented groups) constitute an important population whose participation is vital for enhancing STEM representation and promoting economic advancement in the United States and globally (Morton & Parsons, 2018; Ferguson & Martin-Dunlop, 2021). Much of the research focused on increasing STEM representation does not adequately address the everyday information lives of Black women, especially as these are shaped by the intersection of their race and gender identities. Although literature largely documents racialized and gendered challenges, it overlooks their information environments, patterns of information behaviour, and everyday information needs that are essential for their survival and success. Thus, incorporating information behaviour research into studies of Black women in STEM is necessary to wholly capture their lived experiences at the nexus of race and gender, and for understanding other factors influencing their participation and STEM advancement.

To address this gap, this article proposes a research framework that integrates information behaviour with race and feminist theories. While each of these theories cannot singly analyse information practices or everyday experiences, combining these perspectives enables a holistic inquiry into the lived realities of Black women in STEM (Savolainen, 1995). This framework aims to unravel hidden inequities and racial discrimination in information systems and illustrate how intersecting racial and gendered identities shape information practices under constrained circumstances (Savolainen, 2009). Drawing on existing literature, the study applies this framework to explore the participation of Black women in STEM.

This work contributes to knowledge on closing the racial and gender gaps in STEM, advancing equity, and expanding information behaviour research to underexplored contexts in the field of information science and studies of race and gender. Integrating information behaviour with race

and feminist theories offers a novel analytical approach to addressing systemic inequality and marginalization in STEM fields.

Theoretical discourse

Theories provide conceptual frameworks for understanding phenomena and the relationships among them without necessarily predicting change (Given et al., 2023; Labaree, 2025; Wilson, 2022). Information behaviour theories and models, including social cognitive theory, activity theory, Dervin's sense-making theory, Wilson's model, and Savolainen's model, offer foundational perspectives on how people engage with information in their everyday life. Dervin's (1992) sense-making theory and Savolainen's (1995) everyday life information seeking model are useful for understanding how the intersections of race and gender shape information practices. Dervin's theory explains how people make sense of their experiences during problematic situations through information seeking and use (Dervin, 1992), while Savolainen emphasizes how information practices are shaped by one's way of life and everyday activities, including the use of diverse information sources and systems (Savolainen, 1995, 2009). However, these frameworks focus primarily on information seeking, whereas Wilson's model of information behaviour encompasses a broader range of information behaviour.

For this study, Wilson's model of information behaviour is integrated with intersectionality theory and critical race theory to develop a single conceptual framework for examining the lived experiences of Black women in STEM fields. This integrated framework enables analysis of how information needs are shaped by intersecting identities, processes taken to satisfy these needs, the barriers encountered, and structural conditions within information systems that create uneven outcomes.

Wilson's 1981 model of information behaviour

Wilson's model was developed to describe the processes underlying human information behaviour, from the initial recognition of an information need to the steps aimed at satisfying that need. It posits that information behaviour begins when a user perceives a need and engages in active information search through information systems or other sources. This process may result in success or failure (Wilson, 1981, 1999). When information needs are unmet, the search process is reiterated till the need is met. Black women in STEM frequently experience structural challenges that limits their academic and professional success. Wilson's model provides a framework for examining how Black women in STEM navigate information systems and sources in their quest for not only success but also survival within inequitable STEM environments.

Intersectionality theory

The intersecting identities of race and gender shape the distinctive lived experiences of Black women and must be examined jointly rather than as separate categories to fully understand how they navigate information seeking and meet their unique needs. Crenshaw's (1991) theory of intersectionality argues that the experiences of women of colour emerge from intersecting and interdependent systems of racism and sexism, making it difficult to capture these experiences when race and gender are analysed separately. The intersection of these identities is therefore the key to understanding Black women's everyday experiences. Intersectionality has been widely applied to examine how multiple identities influence perception, treatment, and lived experiences across social and professional contexts (Charleston et al., 2014; Morton & Parsons, 2018; Dickens et al., 2021). For Black women, the intersections of race and gender create uncommon stereotypes and biases that cannot otherwise be experienced singly (Eaton et al., 2020). The identities of Black women as being doubly marginalized provides a critical lens for examining the social, institutional, and organizational structures that shape their information practices.

Critical race theory

Critical race theory gives a lens for understanding the relationship among race, racism, and power. It is built on the principle that, firstly, race is ordinary, and embedded in everyday practices; secondly, race is difficult to address because it is often unacknowledged particularly within colour-blind conceptions of equality; thirdly, race is socially constructed, arising from social relations and perceptions rather than biological difference (Delgado & Stefancic, 2023). Critical race theory is closely aligned with intersectionality in its emphasis on how race interacts with other identities, such as gender, to shape lived experiences and structural inequities (Dixson & Anderson, 2018).

Conceptual framework: information behaviour and STEM participation of Black women

Responding to the call for the application of information science theories to address the underrepresentation of Black women in STEM (Adewunmi & Ocepek, 2025), this study presents an information behaviour framework that offers a holistic inquiry into Black women's everyday lives as shaped by intersecting racial and gender identities and experiences of discrimination. Drawing on Wilson's information behaviour model, critical race theory, and intersectionality theory, the framework integrates these perspectives to examine the relationship among information practices, intersectional identities, and structural inequities. Although specific information sources are not examined, the framework provides insight into Black women's participation in STEM through the lens of information behaviour.

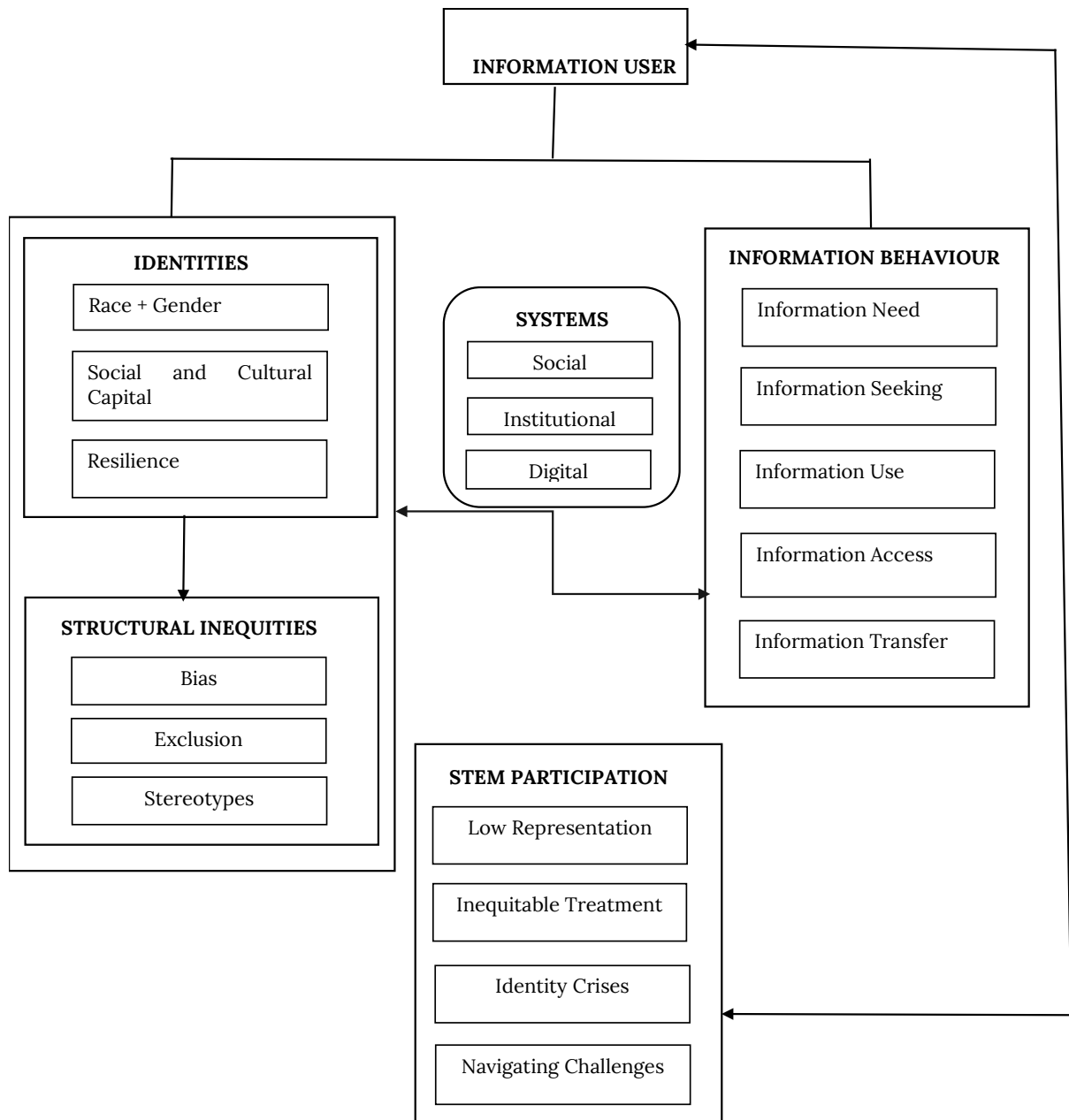


Figure 1: Information behaviour and STEM participation of Black women

As Wilson notes, the purpose of models is to provide a framework for thinking about complex problems (Wilson, 2022). Accordingly, the research framework presented here is designed to account for the lived experiences of Black women in STEM as they navigate information needs within environments where they remain a minority population. The framework foregrounds core elements of information behaviour while explicitly incorporating the identities of information users, their experiences as STEM participants, and the social, institutional, and digital systems that structure the relationship between identity and information practice, functioning as both points of access and sources of constraints. In doing so, it advances an information-science-oriented approach aimed at identifying interventions and informing the design of more equitable systems that support Black women's persistence and success in STEM spaces.

This model conceptualises Black women in STEM as information users whose experiences are shaped by intersecting identities and structural inequities that directly influence their information behaviour, and consequently their representation in STEM fields. Existing literature documents persistent underrepresentation (Dickens et al., 2021; Ferguson & Martin-Dunlop, 2021; Morton & Parsons, 2018), inequitable treatment (McGee & Bentley, 2017), identity crises (Ireland et al., 2018), and ongoing structural challenges that limits success (Charleston et al., 2014). Within STEM environment, race and gender are often the most salient identity-markers shaping how Black women are perceived and treated. However, these identities are accompanied by other forms of identity developments such as, social and cultural capital, and resilience, which emerge through sustained engagement with STEM spaces and play a significant role in shaping lived experiences (Ferguson & Martin-Dunlop, 2021).

Structural inequities, including bias, exclusion, and stereotypes, are institutional responses to these intersecting identities and exert cumulative effects on information behaviour. These effects are evident within information practices which involves the articulation of information needs, active information seeking, and access to information. The study extends existing models by incorporating information access as a key variable that highlights the persistent divide between those who can successfully obtain and use information and those who cannot. Successful information use often leads to information sharing among peers, a practice that strengthens social capital and supports collective survival and advancement within STEM contexts (Alfred et al., 2019; Ferguson & Martin-Dunlop, 2021).

Importantly, Black women's information behaviour is situated within social, institutional, and digital systems that structure access to information in inequitable ways. Social networks, institutional policies and practices, and digital platforms may either recognize intersecting identities and support information use or alternatively, be designed for a generalized user population without attention to diverse needs. These systems can therefore function as facilitators or barriers to information satisfaction, shaping both access and STEM outcomes.

This model contributes to STEM and information behaviour research by positioning information practices as central to understanding STEM participation and representation. It focuses attention to the ways identities intersect with information behaviour across STEM contexts and suggests questions that links systems design to lived experience. This model highlights how repeated failures to satisfy an information need may reflect systemic barriers within information systems rather than individual's limitations.

Implications for research, policy, and practice

A range of information behaviour models has explored human information practices across diverse contexts. In studies of race and gender in STEM, frameworks such as Black feminist thought, critical race theory, intersectionality theory, and resiliency theory highlight structural inequities and identity formation but often overlook how Black women engage with information in everyday academic, professional, and digital spaces (Charleston et al., 2014; Dickens et al., 2021, Ferguson & Martin-Dunlop, 2021).

Human behaviour is constantly shaped by changing environments (Wilson, 2022) and experiences of racism and sexism influence information needs and practices over time. The intersection of race and gender produce distinct everyday information needs linked to individuals' pursuits, roles, and responsibilities (Gibson & Martin, 2019). Studying the information behaviour of Black women provides insights that can inform research, policy, and practice, particularly in the design of equitable and inclusive information systems and technologies that support meaningful STEM participation (Chung & Yoon, 2015).

Directions for future studies

The application of this framework will be extended to explore specific information sources consulted by Black women in STEM, such as human sources, as well as digital information environments, such as social media and online chat groups. Future research would examine what occurs when a user repeatedly fails to satisfy information needs, not because of a lack of effort, but because systemic barriers within information systems consistently prevent successful information retrieval.

Conclusion

By situating this work within information behaviour, this study offers a novel lens for understanding how Black women in STEM navigate challenges and cultural differences, access support, and build resilience in spaces where they are often excluded. Developing equitable systems and inclusive policies requires holistic inquiry into the lived experiences of those most affected. This will inform more effective and relevant decision-making that addresses marginalization and supports the creation of a more equitable society.

Acknowledgements

I am thankful to the peer reviewers of this article for their constructive feedback.

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