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BOOK REVIEWS

JANE MARGOLIS, RACHEL ESTRELLA, JOANNA GOODE, JENNIFER JELLISON HOLME, & KIMBERLY NAO. *Stuck in the Shallow End: Education, race and computing*. Cambridge MA: MIT Press (2008). 216 pp. C\$ 18.24 (hard cover) (ISBN 13 978-0-262-13504-7).

Margolis previously contributed as main author to the 2002 book, *Unlocking the Clubhouse: Women in Computing*, in which she developed a subtle analysis of difficulties, stereotypes, and prejudices that female students encounter when they study undergraduate computer science programs (Margolis & Fisher, 2002). Advancing a powerful intervention strategy for improving females' participation in undergraduate computer science programs, this study is now recognized as a milestone in the field of inclusive education in computer science education. Similarly, *Stuck in the Shallow End: Education, Race and Computing* is a study incorporating a multilayered analysis of high school computer science education based on race, social economic status (SES), and gender. Structured in six chapters, this book forms a solid piece of research designed as an ethnographic multicase study of computer science programs in three high schools in the Los Angeles Unified School District (LAUSD).

The authors of this study agree with some educational technology researchers that technology is far from being a "great equalizer" (p.1) (Becker 2000; Warschauer, Knobel, & Stone, 2004). While a great number of studies have presented social barriers that make minorities unable to access computer technologies, few studies focused on revealing discriminations in computer science education. This book covers this gap in research by going beyond an analysis of equity in general computing literacy. For Margolis, computer science education has a paramount role in shaping education by being an interdisciplinary subject across the school curriculum, touching and influencing every discipline. The computer science discipline includes not only studying hardware and algorithms, but also implementing computer applications in society. As an immediate consequence, computer science teachers are seen by the authors as important agents able to effect change in society. In particular, teachers from

underrepresented backgrounds coming to teach to disadvantaged minorities are seen as important role models.

In order to reveal evidence about systemic exclusion faced by minorities, a long sequence of comparisons with the sport of swimming is brilliantly revealed at the beginning of the book. As Margolis et al. note, “the history of swimming foreshadows an interaction of factors (structural norms and belief systems) that are related to the underrepresentation in computer science” (p.139). Swimming was a segregated sport, in which African-Americans were forbidden to practice in public premises, until the middle of the 1950s. Even after this period, substantial racial tensions and a lack of opportunities were reported, as high performance swimming requires a certain amount of money and some social affluence. Unfortunately, it was no surprise that minorities underperformed, and some mass-media racists labelled Blacks as “sinkers.” This is somewhat linked to the case of computer science education, where learning the latest trends in computer technology requires substantial financial means for students to fully participate. Having the requisite income implies that student participation is predominantly, if not exclusively, from the middle class or a higher economic echelon.

This book presents some compelling statistics about social inequities in accessing computer science education across the state of California. For instance, the percentage of high SES schools offering computer science classes is double that of low SES schools and the percentage of minorities who receive advanced courses in computer science is three times less that of Caucasian students. Instead, the percentage of minority students taking basic computer literacy classes is double that of their Caucasian counterparts. These statistical aspects across the state were similar to the results reported in this book. Two of the three high schools who have an important number of minority students offer only basic computer literacy skills, while the third offers advanced courses in computer science but has few minority students registered in these classrooms. The study confirms that secondary schools in high-income areas have qualified instructors teaching computer science, while for low-income areas there are often unqualified teachers who are teaching underprivileged students only basic computing skills.

A separate chapter considers the consequences of poor counselling in education. Improperly done, counselling has a major negative role in gate keeping and amplifying social barriers and prejudices. The authors report cases in which counsellors discretely redirect minority students’ interests, because the study of computer science is considered too hard for them. The argument is that taking computer science courses might damage their academic records, and therefore they are deemed inappropriate. Consequently, at an early stage in life, self-exclusion takes place: students from disadvantaged backgrounds voluntarily avoid taking computer science classes, as encouraged by counsellors and peers.

In many circumstances, minority students are not encouraged to take part in advanced placement classes in computing. According to the authors, this creates the basis for systemic discrimination against minorities where computer science fields are necessary skills. Even when these students succeed, self-doubt remains conditioned by the exclusionary practices of contexts where race and gender limit learning opportunities. Margolis et al. report a case involving a computer science teacher, whose efforts to improve social participation by minorities were favoured by the school board, yet the teacher struggled with the indifference of the local community and school administrators. In contrast, non-minority students did not face indifference from local officials; by persistently claiming their spaces, they created ways to easily negotiate access to knowledge, and were thus able to further their higher education opportunities.

The outcome of this situation is summed up by the authors' observation that "perceptions of who is smart enough often fall along racial lines" (p. 59). In this way, the apparently inclusive phrase, "the best and brightest," is vague at least, and often masks discrimination reflected in low representation of racial groups. "We believe that the phrase is mostly used mindlessly, with no awareness of the deep structural inequities that keep so many students in low-resourced schools 'stuck in the shallow end', ultimately written off, and unable to realize their full potential. They have been robbed. And they are largely unseen" (p.137).

The authors are not content to just report on inequities. Thankfully, they also suggest strategies for overcoming the social barriers due to race and gender. The results of the research in which the authors were active in promoting minority participation are impressive. In only three years, the total number of computer science students in these three schools doubled. In particular, the number of students in computer science classes doubled for African-American and female students and quadrupled for Latino students. Equally important, many teachers reconsidered their professional and social responsibilities in order to improve the inequitable context in which they teach.

In the *Afterword*, Richard Tapia recollects his personal case of discrimination when he was a Latino high school student and his academic merits were systematically ignored. He narrates his later achievements as a painful process, being helped by parents and friends, but being undermined by unfair policies and indifference coming from the American educational system. Remembering the salient moments of his academic life, he confirms some claims that the authors advanced in their study and notes that minorities are still struggling in achieving their legitimate goals of access to education in mathematics and computer science:

Minority students in high school are in the great danger of being made technologically rich but cognitively poor. In the shallow end they are not encouraged to be innovative or to pursue paths leading to high-end technology jobs. (p.144)

This research supports findings from other disciplines, such as mathematics, science and engineering, that report students of colour being systematically exposed to isolation and failure (Seymour & Hewitt, 1997). In all, this timely book offers novel perspectives on studying inequities in computer science instruction and deserves much attention from computer professionals, educators and social activists.

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