FOREWORD:

FRAMING TECHNOLOGY THROUGH THE LENS OF HISTORY

By Alicia L. Moore and La Vonne I. Neal

While watching television, we saw a commercial for a university whose tagline is "technology changes everything." Throughout this commercial, elementary school students were holding smartphones and tablets. One student said, "If you have this (pointing to a tablet), you do not need this (pointing to a school building)," and another student stated, "The world's your classroom." As educators, we interpreted the students' words as a call for innovation, and that led us to think about how they will transition from consumers of technology to creators of technology. Specifically, we posited the role of teachers to inspire innovation.

Authors in this special issue share the experiences of African Americans who were inspired and became harbingers in librarianship, early consumers and creators of technology, or contemporary leaders of technology. Moreover, the authors use oral narratives to interpret human experiences to preserve and transmit the history of technology. An early technology leader, Dr. George Washington Carver, once said, "This old notion of swallowing down other peoples' ideas and problems just as they have worked them out without putting your brain and (originality) into it and making them applicable to our specific needs must go, and the sooner we let them go the sooner we will be free and independent people."[1]

Over a century later, ideas of problem solving supported by Carver and others can be seen in the field of computer science and beyond. This is sometimes referred to as computational thinking. The phrase "computational thinking" is not new; Seymour Papert is credited with first introducing the phrase in 1996.[2] Since then, it has been applied beyond the computer science world, and can best be described as a construct by Carnegie Mellon's Center for Computational Thinking:

> Computational thinking is a way of solving problems, designing systems, and understanding human behavior that draws on concepts fundamental to computer science . . . [c]omputational thinking means creating and making use of different levels of abstraction, to understand and solve problems more effectively. Computational thinking means thinking algorithmically and with the ability to apply mathematical concepts such as induction to develop more efficient, fair, and secure solutions.[3]

In essence, computational thinking is a way of thinking that is process-driven: a computational thinker develops a set system, based on the tenets of computer science and engineering, for how to approach a problem. Computational thinking has several characteristics[4], and the goal of the computational thinking movement is to ensure that everyone begins to think like a computer scientist.[5] Imagine a new commercial with students saying, "We can design anything!"

Notes

1. George Washington Carver, *George Washington Carver: In His Own Words*, ed. Gary Kremer (Columbia: University of Missouri Press, 1991), 84, http://books.google.com/books?id=JcncXGNSJQQC.

1. Seymour Papert, "An Exploration in the Space of Mathematics Educations," *International Journal of Computers for Mathematical Learning* 1, no. 1 (1996): 95–123.

2. Carnegie Mellon Center for Computational Thinking, "What Is Computational Thinking?" http://www.cs.cmu.edu/~CompThink/.

3. Jeanette M. Wing, "Computational Thinking," *Communications of the ACM* 49, no. 3 (2006): 33–35, http://www.cs.cmu.edu/afs/cs/usr/wing/www/publications/Wing06.pdf.

4. Jeanette M. Wing, "Research Notebook: Computational Thinking—What and Why?" http://link.cs.cmu.edu/article.php?a=600.

Teacher Resources
• Carnegie Mellon's Center for Computational Thinking:
http://www.cs.cmu.edu/~CompThink/resources/index.html

• Jeannette M. Wing, "Computational Thinking":
http://www.cs.cmu.edu/ourcs/presentations/ct.pdf
See also http://www.cs.cmu.edu/~wing/publications/Wing06.pdf

• Google: Exploring Computational Thinking:
http://www.google.com/edu/computational-thinking/ (There is also a link to a lesson and examples under the "CT Models in K-12 Curriculum" section)

• Barr and Stephenson, "Bringing Computational Thinking to K-12: What is Involved and What is the Role of the Computer Science Education Community?"
http://csta.acm.org/Curriculum/sub/CurrFiles/BarrStephensonInroadsArticle.pdf

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