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**Analytical Memo Example**

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**Reference:** Rankin, Y. A., Thomas, J. O., & Irish, I. (2019, February). Food for thought: Supporting African American women's computational algorithmic thinking in an intro CS course. In *Proceedings of the 50th ACM Technical Symposium on Computer Science* Education (pp. 641-646). Minneapolis, MN: ACM.

## Main Ideas

*Food-Related Activities Supported Learning of Algorithmic Design and CAT*

**Memo Writer Summary:** *35 African American women (24 in Spring 2015 and 11 in Spring 2016) in an HBCU participated in an introductory CS course. The course developed their Computational Algorithmic Thinking (CAT) through food and recipes that leveraged their everyday experiences. A pre-course survey showed that over 80% of students did not know how to design or apply algorithms. Following the* Dessert Wars Challenge *activity – during which students created an original “recipe” out of dessert ingredients, most students self-reported an understanding of the characteristics of algorithms as well as learning creativity. Researchers found that the Dessert Wars activity supported students in the Spring 2016 course (11 participants) to write well-defined algorithms, suggesting that the food activity was a bridge between students’ tacit knowledge and understanding of algorithms/CAT.*

**Author Summary:** “Students successfully articulated algorithms in two different contexts---first, as recipes of desserts which are exemplars of algorithms and second, as a solution to the cashier problem mentioned above. A few students even created real life scenarios (i.e., “Bill wants to buy 6 basketballs for $10 each.”) to situate their algorithmic solutions. Students’ ability to perform both activities confirmed previous research which explored the potential of food-related activities to serve as a bridge between students’ tacit knowledge of algorithms in the context of recipes and their explicit knowledge of the design and implementation of algorithms as a problem-solving tool in an academic setting [20]. Furthermore, qualitative analysis of students’ online reflective journals suggested that students thought critically about the characteristics of a well-defined algorithm and developed skills to write precise and organized algorithms with little if any ambiguity” (p. 645).

**Evidence:** “One student wrote, ‘I learned that an algorithm must be written out in a manner so the algorithm can be executed exactly. This is where being unambiguous comes into play.’ Such evidence emphasizes the potential of the *Dessert Wars Challenge* to support students’ developing CAT capabilities” (p. 645).

*Food-Related Activity Helped to Retain African American Women in CS*

**Memo Writer Summary** *The combination of the HBCU environment and demographic makeup of the class, the demographic characteristics of the professor, pedagogical style, and course content contributed to students’ retention in the course. The course that included the Dessert Wars Challenge activity helped to retain African American women in CS – 96% from the Spring 2015 and 100% from Spring 2016 – compared to the Spring 2017 course (79%) which did not include food-related activities. Researchers claimed this is because “[i]ntegration of food-related activities creates an equitable learning experience, increasing student retention in the college-level introductory CS course” (p. 646).*

**Author Summary:** “In comparison to predominantly White institutions (PWIs), 100% of students enrolled in all three sections of the introductory CS course were African American women. Furthermore, the all-women’s southern liberal arts institution and the classroom environment embodied inclusion and challenged the status quo of African American women not representing a critical mass of the STEM student population. In addition, the instructor shared the same ethnicity, gender and life experiences as her students, positioning the instructor to be a role model to other African American women in STEM and CS. Thus, the initial starting point in the course represented a level playing field, since the young women were not a minority nor were they subject to a hostile learning environment that conveyed the message that African American women do not belong in CS. This course also elevated and honored the intersectional experiences of these students, being both African American and female in a Computing space, which is also rare in STEM [5,6,24]. Additionally, the instructor also willingly relinquished some of her power as the instructor to welcome an opportunity for students to criticize her pedagogical strategy, an act of inclusion and an invitation for joint ownership which engaged the African American women as co-designers in creating a more equitable learning experience. These situational factors constituted a more equitable learning environment than most CS departments at PWIs. However, without the inclusion of It’s All in the Mix even in this nurturing learning environment, retention of African American women in introductory CS courses still presented quite a challenge” (p. 645).

**Evidence:** “Comparing the percentage of students who completed the Spring 2015 course to the percentage of students who completed the Spring 2016 course, we had retention rate of 96% (lost 1 student due to health issues) and a retention rate of 100%, respectively, even when students did not have passing grades at midterm. When comparing the retention rate for both course sections to the same introductory CS course taught in Spring 2017 by the same instructor but without the inclusion of the food-related activities, we saw a decreased retention rate of 79% with poor academically performing students dropping the class at midterms. We posited that 21% (7 students out of the initial enrollment of 33 students dropped the class because more instructional time was spent on learning how to write Python code in the first few weeks of the course with less time allocated for extending students’ funds of knowledge to their understanding of the concept of algorithms, how to design them and the correlation between algorithmic design and programming. Anecdotally, students in the 2017 course complained about the fast pace of the course as they struggled with the programming concepts, especially since most of the students had no programming experience prior to taking the introductory CS course” (p. 645).

**Recommendations:** None stated.