LITERATURE REVIEW 3

Aanchal Sharma

Aanchal_sharma@student.uml.edu

Secondary Paper:

MAKING COMPUTER SCIENCE MINORITY-FRIENDLY

- **By Roli Varma**
- **The paper was published in Magazine Communications of the ACM – Next-genration cyber forensics Colume 49 Issue 2, February 2006**

Link:https://dl.acm.org/citation.cfm?id=1113041&dl=ACM&coll=DL#URLTOKEN#

This paper is directly related to my primary paper because it deals with the debate on underrepresentation of minorities1 in computer science (CS) academic programs, and the expected shortfall of candidates from the traditional source (18-year-old white males), has resulted in various measures to increase minority participation in CS education. The author brings an instance where in 2000, African Americans earned 3,497, Hispanics earned 2,155, and American Indians (or Native Americans) earned 172 of the CS bachelor degrees awarded; the figures for whites and Asians were 21,719 and 5,401, respectively. These students were in their junior and senior years and came from different ethnic back-grounds: 11 white (7 females, 4 males), 11 Hispanic (7 females, 4 males), eight Asian (4 females, 4 males), seven American Indian (4 females, 3 males), and three African American (3 males).

The paper deals with the following topics:

1. **Making Courses Relevant: -** As per the author, most of the CS faculty tend to be aware of emerging research on improving classroom instruction through problem-based learning, hands-on experience, use of new technology, and critical thinking. But author says that the classroom teaching style may be dependent on the individual faculty, some changes in content and curriculum require the department, school/college and university's support. And She further adds that faculty members seldom implement changes to update classroom instruction and are not proactive in making CS curricula race inclusive.

2. **Making Courses Relevant:** The authors research states that in a typical public research university, the faculty decides what will be taught, how it will be taught, and the standards of evaluating what has been learned. Faculty may not have time to invest to change their teaching practices due to full-time teaching, research, and service responsibilities.

3. **Care For Students:** Author says that some minority students found a few teachers to be extra strict with them. These students believed that some teachers perceive white and Asian students to be smart and hence more likely to excel in CS classes. Students liked those teachers who were not only knowledgeable, but also cared about teaching, and about the student learning experience. If teachers treat minority students differently, they may convey the subtle message that minorities are not expected to participate fully in CS. Generally, older teachers conveyed to students that they were interested in teaching, whereas younger teachers conveyed a stronger interest in research than in teaching. Several students raised issues that are important in improving minority students' academic performance and learning experiences. Such perception of the faculty prevented a few minority students from asking questions in class or approaching the faculty for help. Students interviewed reported positive experiences with the CS faculty and did not raise strong complaints against them.

4. **Training for teaching Assistant:** Author bring another episode where one Hispanic student noted "When TAs are from different countries, they have different accents, and they cannot explain everything so nicely like American TAs." Some minority students also felt that some of the foreign teaching assistants were old-fashioned in their thinking in dealing with minority and female students. Graduate teaching assistants play a major role in the education process; they participate in the instruction, advising, and evaluation of undergraduate students.

5. **Advisors must recognize Diversity:** Academic advisors are, therefore, resource people who are supposed to be with the students every step of the way as they work to complete their degree. Academic advisors work with students to develop their degree completion plan. The advisors generally planned the whole CS curricula to be completed in four years even though none of the students interviewed expected to finish their degree in that time frame. Traditional students enter university immediately after finishing high school, while non-traditional students may have to work for a number of years after high school to save money for their college education. So, they are going to face other factors besides being interested in education." Consequently, many minority students felt overwhelmed. Many minority students were worried financial aid would not be available after four years, and they felt they were not provided counseling and guidance to deal with this financial aid crisis. Many minority students interviewed indicated that they were married, had young children, or were single parents. They believed advisors often did not know what was going on in the classes and the academic problems students face. A good academic advisor needs to be aware of the particular nature of the field he or she is advising, and the diverse needs of

students. Ideally, academic advisors are aware of the diverse challenges facing students, but this is not always the case. They felt that the CS program was designed for those students who joined immediately after high school, and who were single, childless, and not working. Computer programming courses tend to take extra time to complete than other courses, and thus are all the more demanding for non-traditional students.

6. **Connecting with Fellow Students:** While white students cited intrinsic interest in computers as the main reason to major in CS, minority students pointed to pragmatic factors such as secure employment and high pay. So, usually [they] just talk about computers all the time." Minority students also differed from white students on their reasons for majoring in CS. The existence of a strong white male culture such as this one in CS may inhibit a positive climate for minority students, especially female minority students. However, some minority students did feel a little air of competition with white students.

7. **Bridging Digital Divide:** To foster user-friendly classrooms for minority students, the CS department should train faculty to demonstrate appreciation for minority students' learning styles and social context. The first question is what should be done with those minority students who do not experience early exposure to computers and whose high school teachers do not put computers to good use by teaching simple programming and as an aid for solving mathematical problems. Specific examples could include increasing instruction on debugging tools and techniques in CS courses to decrease student frustration with medium-sized code preparation, increasing feedback on programming assignments, increasing in-class problem solving in lower-level courses, and adding problems that demonstrate the relevance of CS requirements. It is important that students, especially minority students, interact with the faculty outside the classroom so they have a sense of belonging to the CS department, the school/college, and the university. Generally, most communication between faculty and minority students takes place in the classroom, which is large and rarely suitable for fostering close associations between faculty and students.

Conclusion: The conclusion of the study is listed below in points.

- To improve teaching effectiveness, teaching assistants should be asked to undertake a course evaluation midway through the semester to get feedback from students.
- Scholarships, which have been the backbone of any effort to increase graduation rates of minority students, need to be combined with other retention activities.

- To ensure effective communication and learning experience, foreign teaching assistants should be encouraged to take those courses that will improve oral proficiency such as communication or public speaking.
- CS departments should recruit senior and/or graduate minority students to serve as mentors for freshmen and sophomore students.
- Another effective way for minority students to interact with each other is to establish an email discussion group.
- It is important that minority students perceive that studying CS is consistent with their view of themselves as members of a group.
- It is important to address what should be done with a high percentage of low-income financially needy minority students.
- The mentors can give minority students a chance to learn from someone who has been in the system a while.

Primary Paper:

IMPROVING THE COMPUTER SCIENCE PIPELINE FOR UNDERREPRESENTED GROUPS

- **By Denise M. Case, Curt Kelly, Deborah A. Toomey, Harold Smith, Michael P. Rogers, Carol Spradling, Junanita M. Cleaver Simmons**
- **The paper is published as a Journal of Computing Sciences in Colleges Volume 33 Issue5, May 2018**

Link: https://dl.acm.org/citation.cfm?id=3205011

I choose this paper because I strongly belive that in today ‘s world where students pay more attention to open resources and try to avoid lectures, the lecture halls and faculty must adopt some interactive measures to regain the interest and also to improve the teaching effectiveness in Computer Science pipeline.

The charm and preservation of underrepresented groups states the scary. Challenge of improving the computer science pipeline. It explores the research and current efforts to address these issues and includes a unique group of partners from school and college. This paper’s basically deals with the discuss of a panel on improving the computer

science pipeline. The topics discussed in the paper are: summarizing the current state of the pipeline, reviewing why it is an important issue to be discussed, examine the various opportunities to improve engagement in computer science pipeline, aspect at techniques and different procedures to improve and regain the interest, retention, and success for students, institutions, and communities. Panel members include organizers of popular public events including CodeFest Kansas City, Coding Olympiad, and the Missouri Nebraska Iowa Kansas Women in Computing (MINK WIC) conference; experienced instructors from the Northland CAPS high school program; and representation from university professors, a school Director, and a Vice President and scholar specializing in Diversity, Equity, and Inclusion.

The paper deals with the following personalities: Denise joined Northwest in August 2015 and teaches a variety of courses in programming and advanced data systems. She is a passionate supporter of computer science and expanding access and interest in this exciting field to underrepresented groups. She is active in the MINK WIC conferences and the National Center for Women & Information Technology (NCWIT) Academic Alliance. Denise Case is an experienced industry consultant and assistant professor at Northwest. Deb has worked in the business world for 13 years including several start-ups, Network Administrator of a medium-size city, consultant for Morehouse School of Medicine in Atlanta Georgia and a civilian contractor for the Army base at Ft.

Curt Kelly has been teaching Computer Science at the secondary level for 20 years and has helped teachers integrate technology. He was in higher education for 5 years including teaching Computer Science and the Director of Data Processing. Rogers has been teaching at Northwest Missouri State University for the last 7 years, and previously taught for 11 years at Millikin University. He has experience teaching a wide range of undergraduate Computer Science courses, including teaching Java and Python to new majors. Carol Spradling has been teaching at Northwest Missouri State University for 27 years and has taught a wide range of computer science courses, works closely with K-12 educators, with industry professionals and as a Provost Fellow assigned to the Northland CAPS project. Harold is renowned in the Kansas City education community for his efforts to reach out to underrepresented groups, and teaches numerous courses in computer science in the Kansas City school district. Juanita was awarded emerita associate professor at the University of Missouri-Columbia, where she served for fourteen years in the Educational Leadership and Policy Analysis division of the College of Education. She is the Vice President of Diversity, Equity, and Inclusion at Northwest Missouri State University began this inaugural position in August of 2016.