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An Active Learning Experiment for Algorithm Bias Instruction

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In this paper, we discuss our ongoing instruction on algorithm bias to computer science students at three higher educational institutions. We have instructed students about algorithm bias at three universities, with varying demographics, two public and one private. Algorithm bias is a persistent problem in the technology industry and negatively impacts people based on gender, race, and other categories. As systems that determine outcomes for health, employment, education, and incarceration become automated, the impact of machine-based bias can be felt by large segments in society. We are interested in teaching computer students about algorithm bias as many of them are going to become programmers of automated systems and search engines. Awareness of the concept of algorithm bias can be a first step in training future practitioners on the importance of developing non-biased computer systems. Our project started in 2019. We are a computer science professor and two engineering librarians. Initially, we used a lecture-based module to present content about algorithm bias to students. Based on evaluating our initial deployment, we are currently adding active learning components to our lesson plan. Our paper presents our latest instruction which asks students to generate three questions about algorithm bias based on Arthur Costa's three levels of questions. Level 1 requires one to gather information; Level 2 requires one to process the information; and Level 3 requires one to apply the information. Students are asked to generate their own questions so they engage dynamically with the information on algorithm bias presented to them, including specific case studies of racial or gender-based bias. Many of our students are first generation students from disadvantaged groups and have experience with real-life bias. Subsequently, we find that the case studies presented engage students. Asking students to create questions, especially Level 3 questions, can empower them to draw from their lived experiences and apply those experiences to prepare them for their professional endeavors. The active learning aspect of the instruction will help students retain the concepts introduced in the lesson. We will present our most recent teaching outcomes in combination with results from previous instruction.