Exploring Computing Science Programs' Admission Procedures with a Diversity and Inclusion Lens

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ABSTRACT

Computing science education has experienced low attendance and historic declines in registration from different minority groups. The past decade of enrollment surge in computer science undergraduate programs has increased the number of women and minorities in the field, but the improvements are inconsistent and less than expected. An increase in the use of computing science and in the demand of technology workforce is expected in the upcoming years. Thus, computing science is set to shape the future of technology for a diverse set of technology users. Therefore, it is important to analyze how undergraduate program admission procedures are affecting Equity, Diversity, and Inclusion of historically marginalized groups in computing science.

Critical thinking, analytical skills, and problem-solving are considered some of the foundational skills for success in computing science. These qualities are often assessed throughout a student's academic career through grades. Additional factors such as leadership, motivation, intention, prior exposure, and community involvement are also sometimes considered while evaluating candidates in admission procedures. We will explore the factors assessed by different institutions when deciding to admit a student in computing science undergraduate programs and evaluate possible effects of such admissions procedures on diversity and inclusion. We aim

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to identify student success indicators and recommend equitable processes on the basis of our findings.

KEYWORDS

Computer Science, Undergraduate Admissions, Admissions, Diversity, Inclusion, Education Equity

1 INTRODUCTION

The demand for Computing Science undergraduate programs has shown an upward trend in the past decade [2]. The increase in enrollments has affected diversity and inclusion positively, though not to the expected degree [7]. Recent research confirms persistence of women once they enter science, technology, engineering and mathematics (STEM) programs [10]. Therefore, in parallel with the important work on early indicators of enrolment [11], student experience [12] [6], and retention [5][8], there is a need for studies on recruitment and admission [4] processes and their effect on diversity and inclusion. Studies are available on the impact of certain types of admission processes such as affirmative action [9], as well as on the retention of groups of students entering computer science programs through different paths [1]. However, to the authors' knowledge, the impact of how indicators of success are formulated and advertised through admissions processes has not been studied. It is possible that some underlying message in admission processes

affect student decisions. Exploring this possibility is especially important because while registrations in computer science programs have enjoyed a considerable increase, all studies report a lesser growth in diversity when compared to the growth in the overall enrollment, even with affirmative processes implemented [3][9].

Critical thinking, analytical skills, and problem-solving are considered some of the most important skills for success in computer science. These qualities are often assessed throughout a student's academic career through methods such as unified exams, grade point average thresholds, and grades in certain courses. Admission processes such as exam-based, grade-based, broad-based, and open admissions with exam-based continuation conditions each may consider different success indicators or a combination of them. Other elements, such as success in a set of unified college courses before transfer to the computer science discipline, exposure to certain topics, or results of competitions showing advanced skills in problem solving in math or computing, are also sometimes considered.

Additional factors such as leadership, motivation, intention, and impact on the community are also among popular indicators of success considered while evaluating candidates in admission procedures. These criteria are usually considered through resumes, essays, and recommendation letters. While leadership is a desirable quality, students from less affluent backgrounds have lower chances to access environments where they would have the possibility to act as leaders and show initiative. This might discourage (or prohibit) these students from applying to computer science programs, even when they have high potential. The ability of a computer scientist to provide individual technical contribution (as opposed to leadership), on the other hand, can be an excellent factor, but less clear on measured methods for success in CS education.

We will explore the measures considered by different computer science programs for admitting a student in an undergraduate program. We plan to identify the key common factors among admission processes at institutions effectively closing the gender gap. We aim to find out if there is a meaningful correlation between admissions procedures and the gender and racial diversity within admitted student populations.

2 WORKING GROUP OBJECTIVES

We attempt to identify the role of admission processes in gender and racial diversity in student populations and inclusion of historically marginalized groups in undergraduate computer science programs. We are asking

(1) What are the common approaches to admitting students into computer science undergraduate programs?
(2) What are the indicators of student success considered in different admissions processes?
(3) What are the different outcomes of current admissions processes in terms of cultivating diversity and inclusion within admitted student populations?
(4) What are possible ways in which admission processes can promote diversity and inclusion?

To answer these questions, we intend to identify undergraduate computer science programs across the globe that have shown relative success in attracting women and historically marginalized groups. We then plan to analysis their content on procedures and

advertisement of admission processes to learn about their message to target populations. Then, we will analysis diversity and inclusion in their student population. The analysis will be conducted using the institutions' publicly available data. We will formulate success indicators based on the approach of these programs. We will focus specifically on the student success indicators affecting achieving diversity and inclusion, and their consideration within admission procedures of these institutions.

To further our understanding, the data will be integrated with surveys and interviews. We design our study, including surveys, interviews, and case studies, to further our knowledge on the impact of the identified processes and relevant success indicators in the admissions procedures and outcomes. We will consider feedback from different shareholders: Current and prospective computer students who are affected by such admissions policies, admissions offices, and undergraduate program chairs or similar leadership roles deciding on the goals set and the approaches taken towards diversity and inclusion for a program.

We aim to identify and recommend equitable admissions processes on the basis of our findings. It is anticipated that these recommendations will benefit computing science programs aiming to cultivate inclusive learning environments.

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