Educational Initiatives to Retain Hispanic/Latinx Students in Computing: A Systematic Literature Mapping

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***Abstract*—Diversity in Computer Science and Engineering (CSE) majors has been a challenge in the US. Women, Hispanic/Latinx, Black/African American, and Native American students are minorities in CSE majors. Most universities and organizations have worked on outreach activities to these underrepresented minorities (URM). In this context, this paper presents a systematic literature mapping on educational initiatives in higher education for retention of Hispanic/Latinx students in CSE majors reported in the last ten years (2009-2018). The methodology was based on a systematic literature review protocol using four academic databases: Scopus, Web of Science, ACM Digital Library and IEEE Xplore. We found 76 papers about educational initiatives in CSE majors to retain URM students that include Hispanic/Latinx students. We classify the papers to get relevant information about institutions, type of educational initiatives, main conferences, and present these findings in this paper.**

***Keywords*—computer science education, underrepresented minorities, diversity, hispanic, latinx, literature mapping, educational initiatives, retention**

I. Introduction

Despite all the efforts made to recruit and retain people from underrepresented groups in Computer Science and Engineering (CSE) majors in the US, it is still a challenge. Women, Hispanic/Latinx, Black/African Americans and Native Americans are part of the larger groups of underrepresented minority groups (URM) in CSE majors. According to the CRA Taulbee survey from 2018 [1], 11.1% of the students enrolled in 2017 in a Bachelors program in CSE are Hispanic/Latinx, but only 8.4% of Bachelor degrees in CSE were awarded in that year to students belonging to this URM group.

In this context, we present a systematic literature mapping about educational initiatives in higher education implemented or proposed in CSE majors and reported in the last ten years (2009 to 2018, inclusive) focusing on or including Hispanic/Latinx students, the largest ethnic minority group in the US [2].

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II. Methodology

We used a systematic literature review protocol following the guidelines presented in [3] with four academic digital libraries indexing conferences in CSE Education: Scopus, Web of Science (WoS), IEEE Xplore, and ACM Digital Library. We chose 76 papers using the search string shown in Figure 1 and the following inclusion criteria: full papers, US only papers written in English, higher education level interventions, and papers including Hispanic/Latinx students.

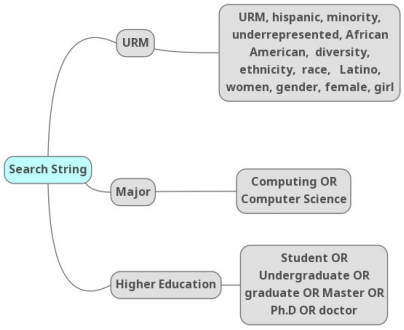

Fig. 1. Search string components.

III. Initial Results

In this section, we present and discuss the results obtained from the 76 papers that focus on educational initiatives to retain Hispanic/Latinx students. Table I lists all the conference names with their abbreviations.

Figure 2 illustrates the frequency of the papers found by conferences and year (2009-2018), where the colors represent the years. The top five conference sources are: ASEE, SIGCSE, FIE, ITiCSE, and SIGITE. 76.92% (50 papers) of the conference papers are from ASEE, SIGCSE, and FIE, which provide opportunities to professors in CSE Education to document interventions at their institutions to retain specific groups of students, including URM groups.

Figure 3 shows the number of papers per state. The figure does not include the US territory Puerto Rico (PR), but we

TABLE I
CONFERENCES NAMES WITH THEIR ABBREVIATIONS.

Abbreviation	Name
ASEE	American Society for Engineering Education
CSEET	Conference on Software Engineering Education and Training
FIE	Frontiers in Education Conference
ICCSE	International Conference on Computer Science and Education
ICER	International Computing Education Research
INTED	International Technology, Education and Development Conference
ITiCSE	Innovation and Technology in Computer Science Education
RESPECT	Research in Equity and Sustained Participation in Engineering, Computing, and Technology
SIGCSE	Special Interest Group on Computer Science Education
SIGITE	Special Interest Group of Information Technology Education
TAPIA	Richard Tapia Celebration of Diversity in Computing

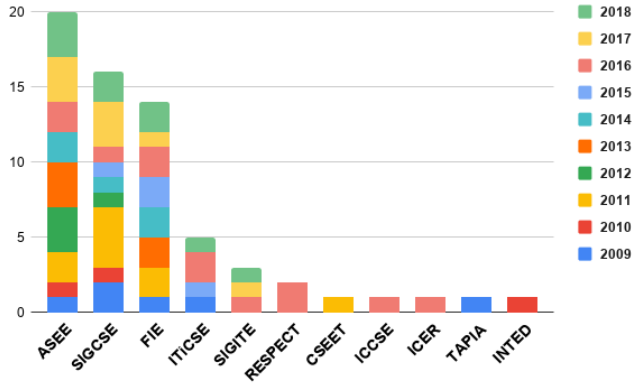

Fig. 2. Number of papers found by conference and year.

found two papers with educational initiatives implemented in PR [4, 5]. This is important to mention since in PR 98.9% of the population identifies as Hispanic/Latinx[6]. We can see in Figure 3 that these interventions have been implemented or proposed in states with the highest number of people that identify as Hispanic/Latinx [2]. In total, 85 institutions implemented or proposed these educational initiatives, of these 27 (31.76%) are in the top 100 institutions in CSE [7].

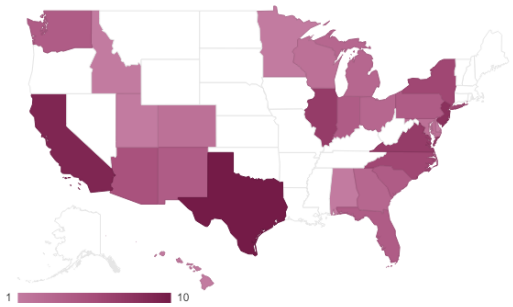

Fig. 3. Number of papers per state (all states, except US territories).

Another result worth mentioning is that 15.58% of the papers focused only in Hispanic/Latinx and the rest of the papers included all URM groups (i.e., Hispanic/Latinx, Native Americans and Black/African Americans). However, 23.28% of the papers did not specify which URM groups they are referring to. Recall that URM groups, not only include people from certain race/ethnicity, but also may include people with disabilities or from the LGBT community. Those papers instead referred to URM groups using general terms, e.g., underrepresented, minorities, non-Caucasian, non-White, non-traditional CSE students, and other related terms.

Lastly, there are more institutions working on retention of URM students (possibly including Hispanic/Latinx) that do not document their interventions in conferences. We believe it is important to always document any possible intervention so researchers in CSE Education can be aware of these results.

IV. DISCUSSION

In this paper, we present a literature mapping aiming to provide an overview about educational initiatives implemented or proposed to retain Hispanic/Latinx students in CSE majors. We show that there is recent evidence of these interventions in states with the highest number of Hispanic/Latinx populations in conferences in CSE Education. We also identified papers that did not specify which URM groups they targeted, but since Hispanic/Latinx are the largest ethnic minority group in the US [2], we did not exclude them from the results presented in this paper.

Future work include improving our search string such that all URM groups are specified and to broader our analysis to incorporate other URM groups. In particular, we want to broader the evaluation of interventions to determine if they were limited based on race/ethnicity or if they also were focused on any other variable(s) such as gender, socioeconomic status, etc.

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