

Closing the Gender and Underrepresented Minority Gap in CS: UTeach Computer Science Principles AP Assessment Results

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Teacher Designed. Research Based. *Significant Positive Results.*

INTRODUCTION

The College Board designed the Advanced Placement (AP) Computer Science Principles (CSP) course to increase participation of girls and underrepresented minorities (Black, Hispanic, Native American students) in K-12 CS. UTeach designed a Project Based Learning (PBL) AP CSP course, teacher professional development and support. This poster discusses the success of this approach during the inaugural administration of the CSP exam.



RESULTS

Pass Rates - All

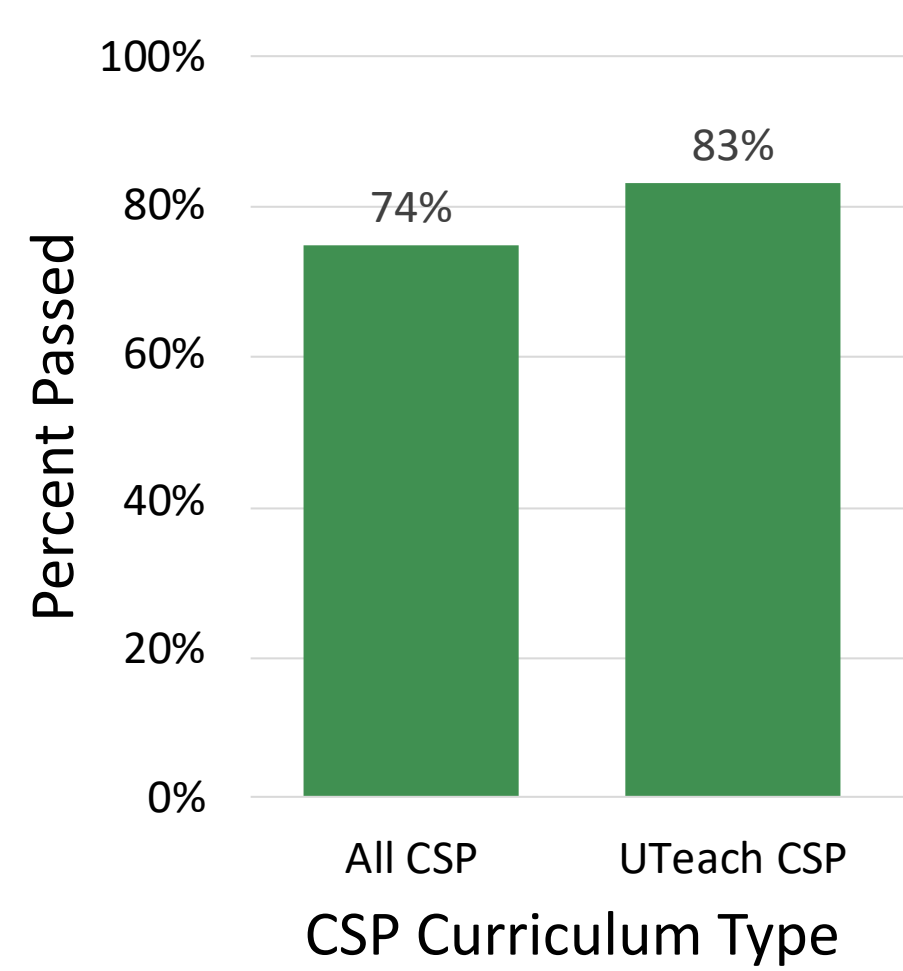


Figure 1

Pass Rates by Gender

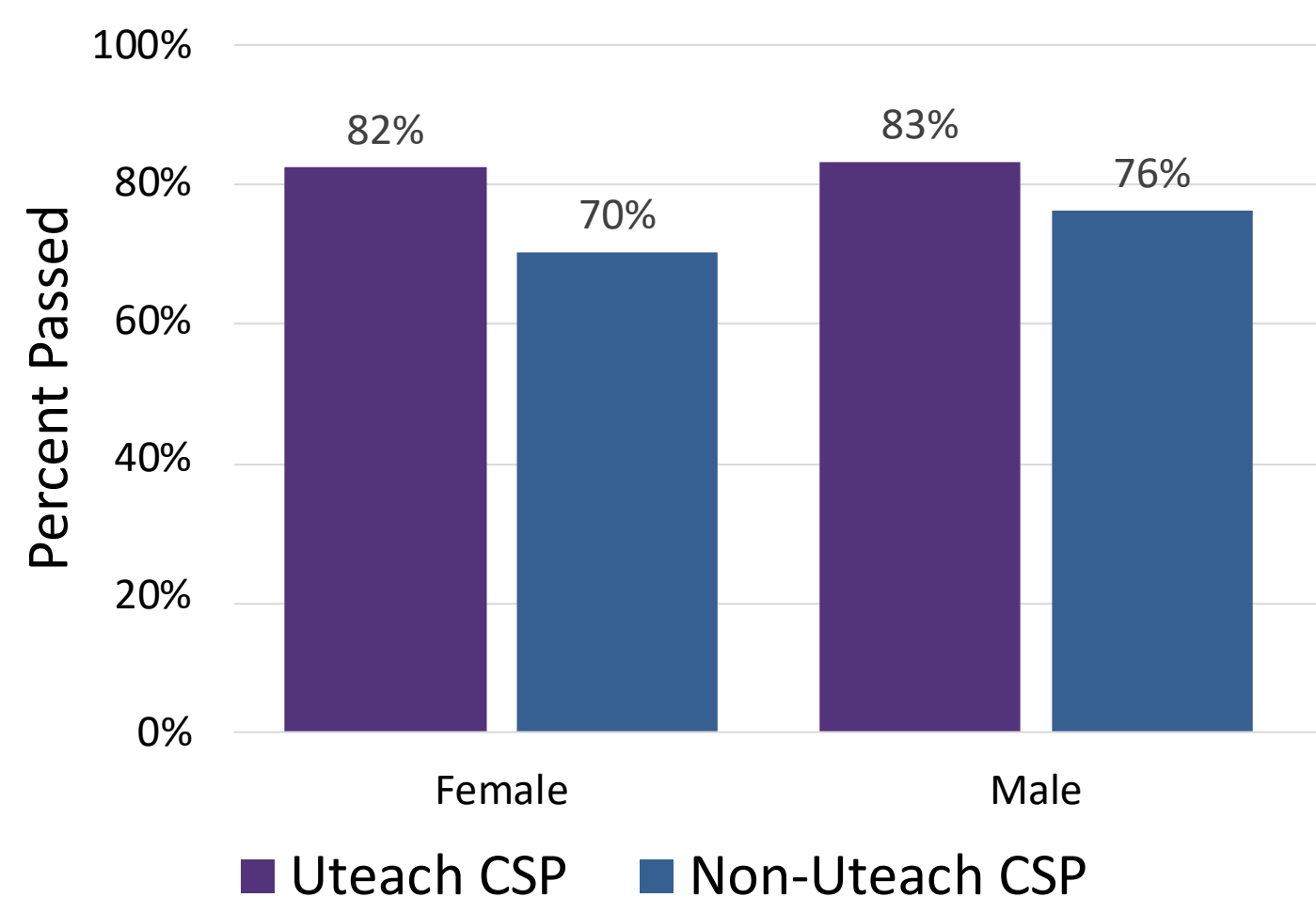


Figure 2

Pass Rates by Ethnicity

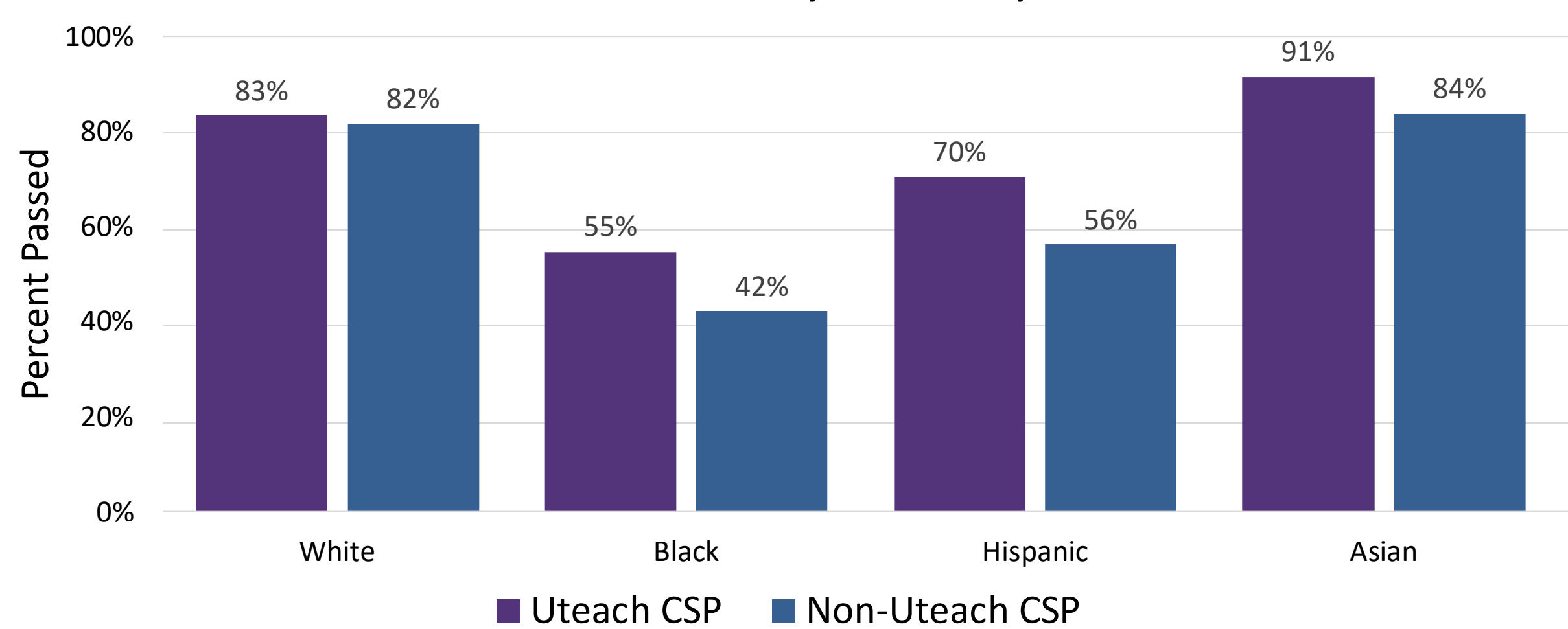


Figure 3

UTeach CSP Higher Pass Rate Difference by Population

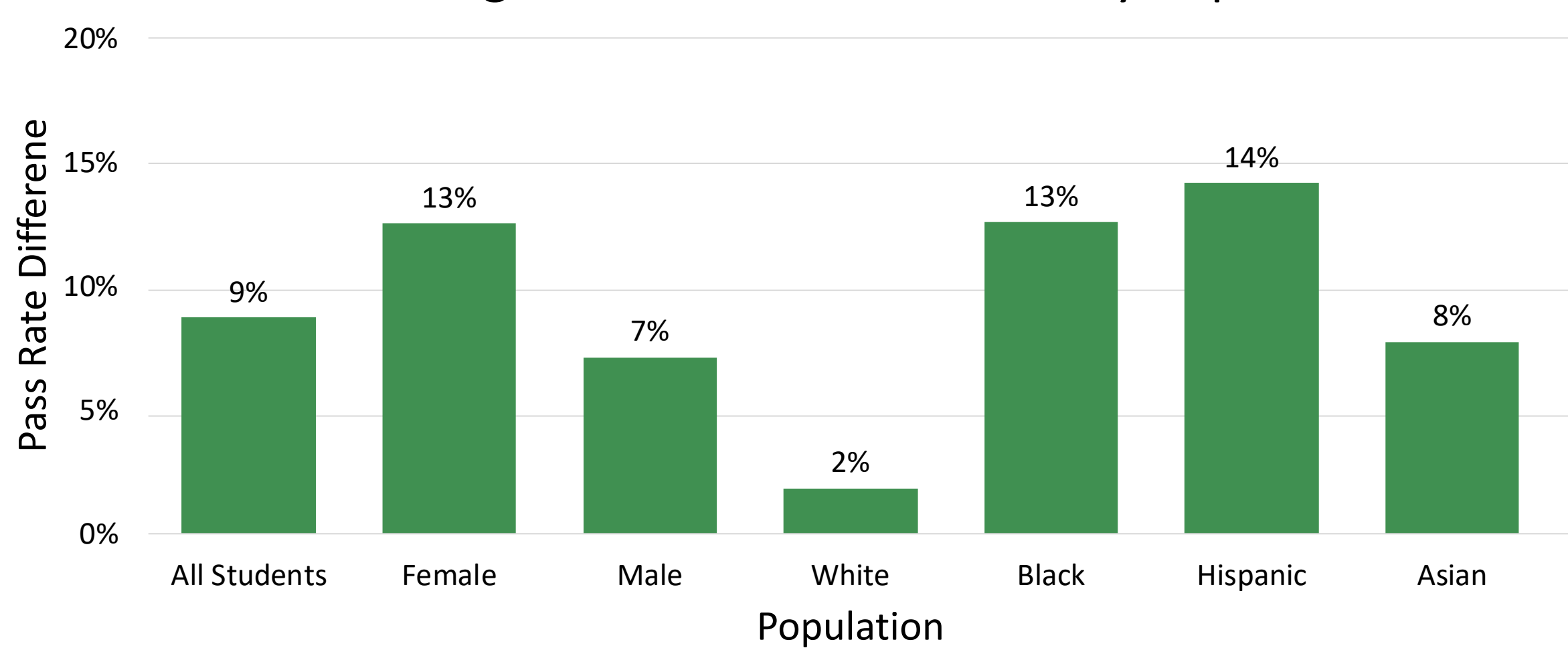


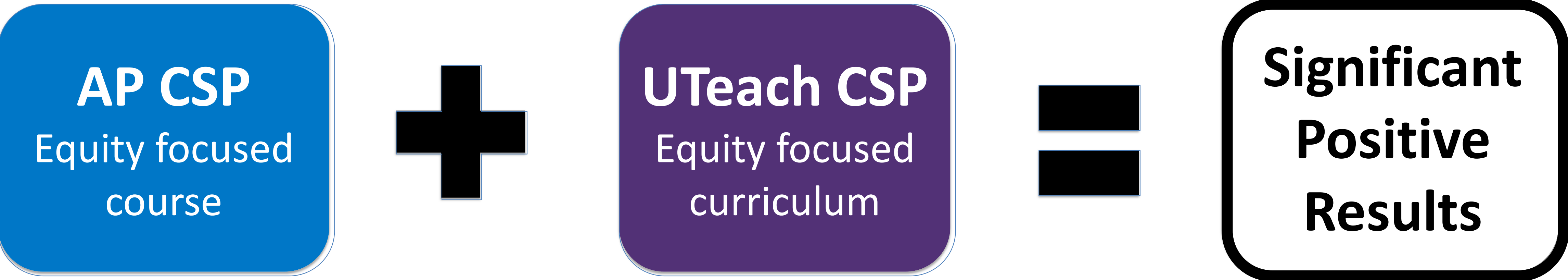
Figure 4

Group	% passing CSP	% expected to pass CSP, adjusted	% actually passing UTeach CSP (SEM)	p
All	74%	78%	83% (0.9%)	***
White	82%	83%	83% (1.5%)	
Black	42%	47 %	55% (5.7%)	.
Hispanic	57%	61%	70% (2.5%)	***
Asian	84%	86%	91% (1.1%)	***
Male	76%	80%	83% (1.1%)	**
Female	70%	74%	82% (1.6%)	***

Table 1

In the spring 2017 administration of the AP CSP exam, students in classes using the UTeach CSP curriculum did well. Overall, 83% passed versus 74% nationally (Figure 1). In addition, for Black students who took the exam, 55% passed versus 42% nationally; for Hispanic students, 70% passed versus 57% nationally (Figure 2); and for women, 82% passed versus 70% nationally (Figure 3). While pass rates were higher for both genders and all ethnicities for which the student count was meaningful, they were highest for women and underrepresented minorities (Figure 4). The differences for women and Hispanics are statistically significant, even when correcting for demographic characteristics of the schools where UTeach CSP courses were offered (Table 1). Technical notes available on request.

OUR APPROACH



The UTeach CSP curriculum’s basis in PBL is central to its goal of increasing participation in computer science. PBL was selected because of its association with higher student performance, motivation and interest [1, 4, 6]. The course incorporates the following research-based elements. References available on request.

- Authentic, personally relevant, and open-ended projects increase student motivation and interest, especially for girls, unrepresented minorities, and lower performers [3, 7, 8].
- Students benefit from structured collaboration, in which team members agree on team rules, each student is responsible for deliverables and communication is required to solve big problems [7, 9].
- Students become more interested and engaged when they have agency in their own learning and can make choices about the work to be completed [2, 5].

CONCLUSION

The results suggest that the UTeach CSP curriculum, professional development, and support improves student performance, especially for girls and underrepresented minorities, which amplifies the impact of the College Board’s AP CSP course. It is recommended that additional research will address curriculum impacts on student performance in computer science. Future goals include development of a PBL programming course and a deeper research examination of the factors leading to success for students underrepresented in CS.