

APPENDIX D: SAMPLE BPC PLANS DEEMED “EXEMPLARY”

These plans are included to help PIs understand the characteristics of strong BPC plans. They are intended to capture characteristics that reviewers have deemed to be exemplary (but are written carefully to be distinct from any actual plans). In many cases, successful plans were submitted by larger project teams that included some personnel who were already involved in BPC activities. Not all proposals will have such large teams and not all proposals will come from PIs with prior experience in BPC. Indeed, not all submitted plans are expected to reach such “exemplary” status; instead, they will be evaluated on the extent to which they represent a step forward for inclusivity based on the project team’s resources and experience, and within context of the institutions and organizations in which they operate.

Exemplary BPC Plan 1: Explorations in Computing for K-12 with Broad Participation

This BPC plan comes from a multi-PI, multi-university collaboration and the proposed interventions focus on women and minorities. *[The proposal cites literature in listing several impediments to the success of women, African American and Latinx students in CS, each of which is specifically addressed in formulating and implementing the proposed interventions.]* The work will have two phases: in the first, a diverse team of graduate and undergraduate students will develop original materials for outreach with particular attention to computing topics that may be appealing to women and minorities. The second phase will employ those materials in a range of outreach programs.

Phase 1: The project will develop teaching materials and demonstrations aimed at high-school students and geared to engaging females and minorities. *[The proposal then gives examples of specific research topics and types of algorithms that might be explored in a variety of areas including DNA sequencing and social network analysis.]*

The development will be assisted by a team of undergraduates across the participating institutions selected so that underrepresented students will make up at least half of the positions. The experience of working together itself will be designed to enhance the self-efficacy of the students and educate them about the value of inclusive environments. *[The proposal then describes the plans for recruitment of underrepresented students.]* At institution X, the team will be recruited from the ranks of students in the following courses [...] and student groups [...]. At institution Y, the team will be assembled from the undergraduate students involved in [...]. At institution Z, the team will be assembled from the undergraduate students in courses [...].

The research topics that will be explored in this material are chosen to be authentic, have intellectual depth, and be appealing to the broader public with the hope that they will stimulate the academic interests in the emerging area of data science and STEM education in general. *[The reviewers liked the inclusion of both graduate students and undergraduates in the BPC plan.]* The PIs, their graduate students, and undergraduates involved in the research components of this proposal will share and jointly develop ideas for these outreach materials and projects. The materials will be demonstrated in hands-on exhibits at ... *[Different STEM-related events held at each of the participating universities were listed along with estimates of the numbers of students potentially reached in each venue.]*

Phase 2: The materials developed in Phase 1 will be transitioned to existing outreach programs at each of the collaborating institutions. At institution X, the materials will be used in displays and as the basis for projects for a week-long, on-campus summer camp [...] and an in-school STEM enrichment program [...]. At institution Y, the materials will be presented in a lecture and mini-research experience as part of a three-week summer academy for high school students. At institution Z, the PI and his students will transition the materials into 10-week summer research projects for Undergraduate Research Experiences (REU) students interested in exploring new data-driven approaches to interdisciplinary challenges—students will join one of two small project teams working on [... and ...], and they will learn how to [...] gaining broad exposure to the modern world of data science.

Metrics: The number of female and minority undergraduate students, and the number of undergraduate students overall, involved in the material preparation, the demonstration events, and the summer activities. *[Targets given for each category.]*

Exemplary BPC Plan 2: Broader Inclusion in Computing

This BPC plan adds a computing focus to *Excite!*, a multi-year, cohort-based, undergraduate STEM program that already exists on the PI's campus. *Excite!* features Student Expos, peer mentoring, REUs, and senior cohort capstone projects, all with the goal of attracting members of *[targeted underrepresented group]* to computing careers. The program offers community-centric learning, research, and development experiences based on the social and relational aspects of learning that have been shown to be most effective for academic engagement and persistence in the sciences. *[Relevant research and federal reports are discussed and cited here.]* The goal is to create a sense of CS identity, belonging, and teamwork.

This project adds a CS thread to *Excite!*, forming *Excite!-CS*, by recruiting and nurturing cohorts of students from *[the targeted group]* with an interest in CS, and increasing the awareness of CS among all of the students participating in *Excite!*.

Overview of the proposed program is:

Student Expos: Student Expos will be held once a semester to recruit freshman and sophomore students for the *Excite!-CS* cohorts. The Expos will be designed with CS activities organized in collaboration with local chapters of *[National/Professional Societies of the target group (e.g., NSBE, SWE, etc)]*. A range of activities will be offered including student-led research presentations, invited speeches, career discussions, and lab visits. *[Citations are given on the effectiveness of these types of activities.]*

Peer Mentoring: *[Citations from the literature on the role of mentoring in student success.]* A CS graduate student mentor will be assigned to each cohort of *Excite!-CS* students, in order to provide personalized mentoring through continuous engagements over the course of the students' four-years. Students in their Junior and Senior years will receive additional one-on-one mentoring in from the PI, who will meet with them regularly to discuss courses, research and/or design projects, and career paths.

REUs: According to *[Citation]*, exposure to traineeships and practical work are among key

elements to sustain interest in STEM *[among students from the targeted minority]*. Top performing students will be selected for 10 week summer REUs with the PI and CoPIs serving as faculty mentors. *[Examples of the types of projects that students might pursue are given.]* For such projects, students will be required to study literature and explore different research approaches. Graduate student mentors will monitor continuous progress and provide necessary resources. The structure of the experience will be modeled on that of the CRA-W CREU and DREU programs *[Citations to CREU and DREU are given along with the adaptation of the programs that are being made here.]* At the end of the experience, students will be required to report findings in a 6-page report and a presentation.

Capstone Design Projects: The Excite!-CS practical learning experience will culminate in a cohort-wide capstone design project. Students, working together, will pursue projects that include both theoretical underpinnings and practical work. They will be given full access to labs for hands-on experience and problem-solving. They will be made aware of the established research methodologies, processes and latest outcomes. *[Examples of possible projects and problems are given.]*

Evaluation of proposed educational activities will be conducted through participation and exit surveys in years 2, 3, and 4 of the project. The evaluation queries and method related to each proposed educational activities are summarized below:

Education Activity	Student Expos	Peer Mentoring	REUs	Capstone Projects
Evaluation Questions	<i>[Each row of this column lists an evaluation question related to expected student outcomes (e.g. awareness of career opportunities, self-efficacy, belonging, and CS identity)]</i>			
Methods of evaluation	<i>[Each row of this column lists a mechanism for data collection needed to answer the stated question (e.g. pre- and post-surveys, focus groups, student interviews, student evaluations, course grades, and post-undergrad outcomes)]</i>			