

Proposal Review 5 : 1829794

Agency Name:	National Science Foundation
Agency Tracking Number:	1829794
Organization:	
NSF Program:	CyberTraining - Training-based Workforce Development for Advanced Cyberinfrastructure
PI/PD:	Hickernell, Fred
Application Title:	CyberTraining: CIC: Cross-Disciplinary Education for Next-Generation Computational Scientists
Rating:	Very Good

Review

Summary

In the context of the five review elements, please evaluate the strengths and weaknesses of the proposal with respect to intellectual merit.

This project led by Illinois Institute of Technology aims to engage students from high school through community college and into undergraduate and graduate studies. The main goal is to expose students to large-scale computation, software design principles, through hands-on experience. The partnerships with nearby two-year colleges (2YC), national laboratories and private industry in Chicago provide multiple opportunities for students to gain skills and practical experience. The multi-level student engagement during overlapping time periods allows for near-peer mentorship through group lunches and end of summer presentations.

Intellectual Merit:

Strengths:

This project leverages existing programs and relationships and outlines a strong plan to build them into a coherent program that will serve students beginning in high school, through 2YC into undergraduate and graduate studies. The activities of the project are primarily scaffolded allowing students to progress through the levels of engagement as they move through their academic career. The PIs are experienced and well positioned to lead the project. The IIT Center for Interdisciplinary Scientific Computation (CISC) is newly established but builds on existing programming within IIT and is poised ready to support this project. The proposal clearly outlines the learning outcomes and the programming that supports achieving these outcomes and references back to them throughout the proposal (although it's not clear but is presumed that 2YC falls under the UG category). There is a plan for evaluation linked to this table of outcomes. PIs point out that the proposed work mostly builds on their previous experience and that they want to go beyond what they've done in the past. The interdisciplinary nature of the PI team is a clear strength.

Weaknesses:

The evaluation plan, while reasonable, would benefit from a dedicated evaluator and dedicated budget that would allow for an independent review of the programs and the overall project. The proposal would also benefit from stronger literature review grounding the need for the study and overall project. The summer CS course is well outlined and it is stated that they will 'encourage the students to pursue degrees' in CS. It's not clear how they will do that, especially when aiming to reach underrepresented groups. Different strategies need to be employed for different groups (male vs. female for example are motivated differently).

In the context of the five review elements, please evaluate the strengths and weaknesses of the proposal with respect to broader impacts.

Broader Impacts:

Strengths:

The broader impacts of the proposed work include reaching students at varied levels of their academic careers, and helping students (and likely faculty) think about computational science across different domains. As students move between academic institutions as they work toward their degree(s) they may take with them this different approach and perspective to CS thereby having a multiplier effect as they interact with new faculty and students at their new institutions.

Weaknesses:

Aiming to share results beyond the CS community at conferences is ambitious and will require attending conferences that the PIs are likely not typically attending. This can be challenging for them to break in to (for giving presentations) depending on the conference.

Please evaluate the strengths and weaknesses of the proposal with respect to any additional solicitation-specific review criteria, if applicable

1. Challenges addressed in training, education, and workforce development

The challenges facing educating computational scientists are clearly articulated and framed in such a way that they are integral to the proposed project.

2. New modes of discovery and use of advanced CI resources, tools, and services in fundamental research enabled

The summary of research enabled by this proposal is reasonable and clearly identified in a section that includes specific examples.

3. Advances in integrating skills in advanced CI as well as computational and data science and engineering into institutional and disciplinary curriculum/instructional material

The proposal lays out a plan for developing 16 specific skills in advanced CI for four different levels of students (high school, two year colleges, undergraduate and graduate). The proposal references back to these skills as each element of the project is described and defined.

4. Steps to broaden access and community adoption with respect to the Nation's scientific and engineering research workforce and advanced CI;

5. Stakeholders engaged and partnerships forged for collective impact

The PIs have established a good set of stakeholders and partners in other universities/colleges, federal laboratories and nearby private industry. Building on these existing relationships and a desire and willingness to grow the network is notable.

6. Scalability to a large number of people directly and indirectly, and sustainability of key aspects beyond NSF funding

The proposal does address post-award plans for sustainability including additional funding sources and expanded partnerships.

7. Plans for recruitment and assessment

The proposal articulates a plan for recruiting student participants. As stated above, it would benefit from more explanation on why they believe their recruiting strategy will be successful and evidence do they have that it will work? The assessment plan is reasonable but also very elaborate and the lack of a dedicated, independent evaluator may hamper progress. The evaluation plan proposed is not scalable and may not be tractable.

8. Plans for management and collaboration

The plans for management and collaboration are threaded throughout the proposal and collectively are a reasonable approach to the work.

Constructive suggestions for improvement:

Overall the proposal is well written and very well organized. The level of detail provided in most areas is very helpful and provides strong context. For example, identification of personnel who take on the tasks associated with recruitment is very helpful; this level of detail throughout (whenever possible) is recommended.

In several places statement would benefit from additional literature support or explanation of the rationale for the work, e.g., why would you expect students who may not have a strong computer background be attracted to a course? What is their motivation? Why would they do it?

Data Management Plan:

Overall the data management plan is reasonable. It is missing a discussion about the assessment of the program activities and how that data will be collected, protected, and stored.

Summary Statement

This is a well written proposal that is very thoughtful and well organized, building on existing projects and adding new and very reasonable project elements that will create an entire program. The project personnel are qualified to do the work and they've assembled an excellent group of stakeholders and project partners. The project outlines very tractable and impactful activities for students at multiple grade levels and designs the work such that everything can be accomplished within the time frame proposed. The lack of an independent evaluator and dedicated budget project evaluation is a weakness to the project.