Preparing a Two-Year College RED Proposal: Practices and Pitfalls

Dr. Julia M. Williams, Rose-Hulman Institute of Technology

Dr. Julia M. Williams is Professor of English at Rose-Hulman Institute of Technology. She is the author of Making Changes in STEM Education: The Change maker's Toolkit (Routledge 2023). Her research areas include technical communication, assessment, accreditation, and the development of change management strategies for faculty and staff.

Dr. Indira Chatterjee, University of Nevada, Reno

Indira Chatterjee has been with the University of Nevada, Reno since 1988. She is a Professor of Electrical and Biomedical Engineering, and has served as Associate Dean of Engineering since 2010. Currently she oversees undergraduate and graduate education, including recruitment, retention and advising. She has won many awards including Foundation Professor, Tibbitts University Distinguished Teacher Award, the Hoeper Award for Excellence in Teaching and Advising, Society of Women Engineers Region A Service Award, the IEEE Student Section Award for Excellence in Teaching, the Nevada Women's Fund "Women of Achievement" award and the Silver Compass Award for Extraordinary Commitment to Students. She has had over 7 million research funding in Bioelectromagnetics and engineering education. She has served as research mentor to postdoctoral fellows and many graduate students.

Ms. Anne K Flesher, Truckee Meadows Community College

Anne Flesher serves as the Dean of the Computer, Mathematical, and Physical Sciences Division at Truckee Meadows Community College, where she also oversees the Engineering program. Committed to enhancing STEM education, Anne champions educational reforms aimed at streamlining the transfer process for community college students to four-year institutions. She played a pivotal role in authoring Nevada's Action Plans, which shifted developmental math education to a corequisite model in 2021. As a representative on the Nevada Alliance team for Complete College America, Anne contributes her expertise to statewide educational strategies. She founded the first community college Society of Women Engineers (SWE) Affinity group at Truckee Meadows and received the STEM Outstanding Community Leader Award from SWE in 2023

Dr. Ann-Marie Vollstedt, University of Nevada, Reno

Ann-Marie Vollstedt is a teaching associate professor for the College of Engineering at the University of Nevada, Reno (UNR). Dr. Vollstedt completed her dissertation at UNR, which focused on exploring the use of statistical process control methods to assess course changes in order to increase student learning in engineering. Dr. Vollstedt teaches courses in engineering design as well as statics and runs the Engineering Freshmen Intensive Training Program. She is the recipient of the Paul and Judy Bible Teaching Excellence Award, F. Donald Tibbitt's Distinguished Teaching Award, The Nevada Women's Fun Woman of Achievement Award, and the UNR College of Engineering Excellence Award.

Revolutionizing Engineering Departments (RED) Projects in the Two-Year College Context: Best Practices for Preparing a Proposal

Abstract

According to the National Science Foundation website, the Directorates for Engineering (ENG) and STEM Education (EDU) fund projects through the Revolutionizing Engineering Departments (RED) program to support "revolutionary new approaches to engineering education [1]". Within the RED Program, funding is offered through three tracks. The Two-Year Colleges track is intended to "develop radically new approaches among multiple two-year institutions to expand the path to engineering and engineering technology [1]". The NSF holds high aspirations for two-year colleges, but challenges exist for faculty and administrators who prepare and submit a proposal for a RED. The purpose of this paper is to identify three major challenges a two-year college collaboration encountered in preparing the first successful Two-Year Colleges RED. In addition to identifying these challenges, we share lessons learned and practical suggestions for two-year college teams who are contemplating a RED proposal. We also introduce a proposed virtual workshop that can support these proposal writers. Because two-year colleges represent a key component in the engineering education ecosystem, we hope to support and encourage others to join the RED community.

Introduction

According to the National Science Foundation website, the Directorates for Engineering (ENG) and STEM Education (EDU) fund projects through the Revolutionizing Engineering Departments (RED) program to support:

> revolutionary new approaches to engineering education, ranging from changing the canon of engineering to fundamentally altering the way courses are structured to creating new departmental structures and educational collaborations with industry. A common thread across these projects is a focus on organizational and cultural change within the departments, involving students, faculty, staff, and industry in rethinking what it means to provide an engineering program [1]

As one of the three funding tracks within the RED program, the Two-Year Colleges track is intended to "develop radically new approaches among multiple two-year institutions to expand the path to engineering and engineering technology [1]". Clearly the NSF holds high aspirations for community college systems in the US. Addressing the current RED project teams at their annual RED Consortium Meeting in September 2023, Dr. Jose Zayas-Castro, division director of the Engineering and Education Centers (EEC) of NSF, emphasized the importance of two-year colleges in providing students with access to higher education and the need to diversify the

engineering workforce. Furthermore, the level of funding offered through the RED program could help faculty and administrators in those systems make significant changes to address some of the major challenges in two-year colleges, such as student transfer success, completion of a four-year college, and students' sense of belonging [2, 3, 4, 5].

Despite the importance of two-year colleges to higher education in the United States and the encouragement from NSF for two-year colleges to apply to the RED program, only one proposal has been funded over the two years that the RED Two-Year Colleges funding track has been offered: from a consortium including Truckee Meadows Community College, the University of Nevada, Reno, Great Basin College, and Western Nevada College, all located in northern Nevada. As the team that collaborated on that proposal, we believe we can help faculty and administrators interested in applying for RED Two-Year Colleges funding to learn more about the program and understand how a RED proposal differs from other NSF proposals. The purpose of this paper is to identify best practices for preparing a two-year college RED and to discuss pitfalls that may challenge proposal writers from these institutions. We also discuss a proposed virtual workshop that could assist proposal writers.

The Revolutionizing Engineering Departments Program

The Revolutionizing Engineering Departments (RED) Program was initiated in 2015 with the funding of six engineering and computer science programs: Arizona State University (manufacturing engineering), Colorado State University (electrical and computer engineering), Purdue University (mechanical engineering), University of San Diego (general engineering), University of Oregon (chemical engineering), and University of North Carolina (computer science). Each project addressed a specific challenge in engineering and computer education evident in the second year of the curriculum, and the goal of each project was to achieve cultural and institutional transformation during the five-year funding window. From 2015 until 2024, there have been twenty-six projects funded at a variety of four-year institutions, both research-focused universities and undergraduate-focused colleges ([7]-[15]). While the funding mechanism has provided important support for academic change in these settings, the lack of two-year colleges from the funding opportunities represented a significant gap.

Two-year colleges provide a key pathway to college access for students. Students choose a two-year program for several reasons, such as reducing costs for the first two years of college, proximity to family and community, and to balance academic with other responsibilities, such as family responsibilities and employment. According to the National Center for Education Statistics, nearly 50 percent of students in the United States begin their college careers at two-year colleges [7]. Thus, including two-year colleges in the RED program indicated their importance in the higher education ecosystem. Despite the availability of funding, however, no two-year college consortium proposal was funded until 2023. We believe that the differences in academic organization, curricula, and support may be the reasons why two-year colleges do not pursue RED funding. We discuss three program-specific requirements of RED that may act as barriers to successful proposals from two-year college consortia.

Three RED Program-Specific Requirements

During the process of preparing our RED proposal, we identified three RED-specific requirements that are not customarily seen in other NSF solicitations. These requirements may at first mystify proposal writing teams, but we can share insights from our experience that, we believe, can assist other proposal writers.

First, the solicitation states "RED Two-Year projects must work with their education researcher and organizational change expert to develop a research plan…[1]". Our writing team struggled with identifying an "organizational change expert" who understood the two-year college context and thus had a change model appropriate to our setting. The change expert who agreed to work with the team on the project did so because he knows the Nevada System of Higher Education [SHE] landscape and the STEM-transfer issues facing community college students. He has a strong rapport with our PI, having worked together on prior Nevada SHE mandated initiatives.

Second, we were challenged by the requirement that we must focus on educational research, rather than the practical concerns of improving the "student professional formation experience," such as, for example, improving and expanding course offerings, student success strategies, and transfer policies. We were, however, fortunate enough to have one of the Co-PIs from our partner university who was trained as an engineering education researcher through an NSF Research Initiation in Engineer Formation (RIEF) grant and had experience working on research on an S-STEM grant. She now serves as the primary engineering education researcher on the RED project, in conjunction with expert advice on research methodology and analysis from one of the consultants for the project. In addition, one of the other Co-PIs from the university partner also has training in conducting quantitative research and is participating in the research dimension of the project. For faculty and administrators in the two-year college context, practical strategies for serving the needs of students (i.e., offering the right mix of classes, providing academic advising, finding faculty with the appropriate expertise, etc.) claims priority over academic research. In our case, however, we were able to recruit to the team an engineering education expert who could contribute the necessary expertise for our project.

Third, we needed to create a vision for our "revolution," an activity that we knew was important but was something we had not attempted before. For that component of the project, we recruited a former member of the Revolutionizing Engineering Departments Participatory Action Research (REDPAR) project. REDPAR has supported the work of RED teams since the inception of the program, and members of REDPAR provide important practical and research information that has improved RED project results [17]-[26]. This individual is a member of our RED project team and serves to help us develop our vision for the project through a series of on-campus workshops during the life of our project.

Conclusion

In addition to sharing our experiences in proposing and winning a Two-Year Colleges RED during our session at ASEE 2024, we are in the process of planning a virtual workshop that we hope to offer in late 2024. During the virtual workshop, we believe we could share the lessons learned and best practices for two-year college administrators, faculty, and staff who are contemplating a RED proposal. We would also like to connect interested proposal writers with experts in engineering education research and organizational change, two fields that are not customarily represented on two-year college campuses. Based on the RED Webinar series that was delivered in 2017 [27] and adapted specifically for the two-year college context, we plan to expand access to the RED funding mechanism through online resources. Because two-year colleges represent a key component in the engineering education ecosystem, we hope to support and encourage others to join the RED community.

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