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BUILD – Poster Board #2

Enhancing Capacity to Address Health Disparities: the ASCEND Community-Based Participatory Research (CBPR) Small Grants Initiative

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Abstract:

Addressing health disparities has proven to be challenging, as has ensuring equal engagement of academicians and community members in health research projects. The Community-Based Participatory Research (CBPR) Small Grants Initiative provides a mechanism and infrastructure that fosters the collaboration necessary to conduct high-quality and impactful research.

This initiative has been implemented for three years. It has funded small (up to \$20,000 each) health related CBPR projects led collaboratively by two co-principal investigators (an academic from Morgan State University and a community stakeholder). There have been three rounds of awards: six awards were approved in the first round, four awards in the second round, and four awards in the third round, for a total of 14 projects.

The CBPR project stakeholders are faculty, undergraduates, and community members, representing a diversity of perspectives and levels of experience. The CBPR program includes establishing a (or working with an established) relationship, conceptualizing the project idea, writing the grant proposal using National Institutes of Health forms, implementing the project and managing the grant, evaluating results, disseminating findings, and, if feasible, sustaining the collaboration/relationship.

A Community-University Advisory Board (CUAB), which includes community stakeholders and representatives from the university, oversees the initiative and makes project award recommendations.

The members of the 14 project teams and the CUAB are the foundation of a learning community, which is fostered by an evaluation plan. The evaluation plan comprises multiple mixed-methods tools that conform to the stages of the program's conceptual model, adapting material developed by the University of New Mexico Center for Participatory Research Engage for Equity project. We believe that the learning community will improve project-specific outcomes, help with partnership sustainability, share external funding opportunities, and mentor future CBPR researchers.

Acknowledgments: This research received financial support from the National Institute of General Medical Sciences, National Institutes of Health, under award numbers RL5GM118972 and UL1GM118973.

BUILD – Poster Board #3

Research Shadowing: High Impact, Low Cost Introduction to Research

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The positive impacts of shadowing experiences on undergraduate students' career exploration has been well documented in medicine and other health-related fields. However, use of shadowing to introduce students to scientific research careers has not been as thoroughly explored. At Xavier University of Louisiana (Xavier), under the National Institutes of Health's (NIH) National Institute of General Medical Sciences (NIGMS)-funded Building Infrastructure Leading to Diversity (BUILD) Program, research shadowing has been used to make students more aware of the research process and expand their knowledge of and enthusiasm for biomedical careers. The BUILD Program at Xavier, Project Pathways, offers opportunities for students to shadow in Xavier research labs and at local partner institutions. The participants observe undergraduate and graduate research students along with research staff and faculty in labs over a period of several weeks. The benefits to the shadowing students include but are not limited to the opportunity to observe and ask questions about live experiments; and the ability to explore the pros and cons of participating in research and attending graduate school. Participants can also form and benefit from mentoring and near-peer mentoring relationships. Shadowing participants are uniformly positive in their responses to post-shadowing surveys and indicated that shadowing was effective at helping them to understand the research process and clarify their goals as related to research. Graduate student shadowing participants responded in a similar, positive manner overall, and on their intent to apply for graduate school. Overall the assessment results show that research shadowing is a low-cost, high-impact intervention beneficial for large numbers of undergraduate students who are curious about biomedical research careers.

BUILD – Poster Board #4

Inculcating a Culture of Research Entrepreneurship: Lessons Learned from the ASCEND Student Research Center

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ASCEND, “A Student-Centered Entrepreneurship Development training model to increase diversity in the biomedical research workforce,” is an NIH BUILD-funded program at Morgan State University, Baltimore, MD. The principal philosophy of ASCEND is that leading scientists have the attributes of entrepreneurs in that they use their creativity to generate novel research ideas, pitch their ideas to secure funding, take ownership of their projects, lead staff and other scientists, are rewarded for their success, and in every step of this venture, they accept the associated risks and responsibilities. Accordingly, ASCEND has designed an Entrepreneurial Training Model (ERTM) which prepares undergraduate students to become leading entrepreneurial scientists by going through four stages: 1) Inspiration, 2) Ideation & Innovation, 3) Implementation, and 4) Growth. To accomplish its goals, ASCEND has established multiple interventions including a student-led organization called the Student Research Center (SRC) where undergraduate students associate with like-minded peers, practice leadership, receive relevant training and mentoring, learn how to develop, implement, and present their own research, and grow through the process. The peer support that students receive through the SRC is particularly relevant to underrepresented minority students who are often disadvantaged by having fewer role models and less peer support in conducting research.

Since its inception in 2016, over 250 students from almost every major and classification have become SRC members. Thus far, 31 student-initiated research concepts have been developed, 13 of which have turned into full project proposals. Compared to a matched control group, SRC members have shown statistically significant improvements in their science identity, science self-efficacy, and academic & personal self-concepts. We will describe the ASCEND ERTM components, rationale, and history, and how it may enhance undergraduate training in biomedical research. We also discuss evaluation methods, possible sustainability solutions, and programmatic challenges.

Morgan State’s ASCEND program is supported by the National Institute of General Medical Sciences, National Institutes of Health, under Award Numbers UL1GM118973, 8RL5GM118972, and 8TL4GM118974.

BUILD – Poster Board #5

The First Five Years: BUILD Training Program at UMBC

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The BUILD Training Program (BTP) at UMBC seeks to enhance the diversity and retention of promising undergraduate STEM majors and prepare them to pursue careers in biomedical and behavioral research. BTP Trainees serve as exemplars in this investigation, which is focused on piloting and refining interventions to inform the creation of a comprehensive, multidimensional model for a public research university. BTP is one component of the STEM BUILD at UMBC initiative that builds on strategies of established UMBC student training programs (e.g., Meyerhoff Scholars, MARC U*STAR) with emphasis on inclusive excellence, capacity, scalability, and sustainability. First-year students with interests in diversity, no other significant scholarship support, and plans to pursue eligible STEM majors are invited to apply for the BTP opportunity and are selected using randomized control trial methodology. Interventions include multi-year summer bridge experiences; cohort building; first-year residency in the STEM Learning and Living Community; supplemental advising; classroom-based group research experiences; opportunities to develop scientific communication skills; noncredit (badging) curricula to develop research skills and goal planning; and credit-bearing courses to introduce a research university, quantitative reasoning, responsible conduct of research, phage-hunting, and bioanalytical training. Comprehensive evaluation methods, which include periodic surveys, focus groups, interviews, and data analyses, have shown statistically significant differences in STEM major retention rates, cumulative GPAs, and research self-efficacy and science identity levels between BTPs and comparison groups. STEM BUILD outcomes demonstrate the need to focus interventions on the first two years of study when undergraduates are most likely to drop out of STEM majors or the university. Other lessons learned include limiting additional credit requirements by using non-credit practicums to advance knowledge and skills; building community through a STEM living and learning community, developing student decision-making skills through enhanced professional advising, and using classroom-based group research to foster research skills and encourage individual research experiences.

NRMN – Poster Board #6

Programs and Outcomes from the First Five Years of the National Research Mentoring Network

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Effective mentorship is critical to the success of early stage investigators, and has been linked to enhanced mentee productivity, self-efficacy, and career satisfaction. The mission of the National Research Mentoring Network (NRMN), in its first five-years, has been to provide all trainees across the biomedical, behavioral, clinical, and social sciences with evidence-based mentorship and professional development programming that emphasizes the benefits and challenges of diversity, inclusivity, and culture within mentoring relationships, and more broadly the research workforce. NRMN has developed and implemented a multifaceted portfolio of programs to enhance national efforts to increase the size, quality, diversity, and research productivity of the biomedical workforce. The goals of these programs combined are to: 1) match and link mentees across career stages to mentors and coaches; 2) train mentors, coaches, and mentees to more effectively navigate and maximize their relationships; 3) refer mentees to career and research resources; and 4) promote the value of career mentoring. Evaluation and outcomes from a broad range of NRMN programs including MyNRMN, MyMentor, research mentor and mentee training, career coaching and intensive grantsmanship coaching will be highlighted. Lessons learned from the first five years of NRMN and future plans including those toward aimed at sustainability will be shared.

IPERT – Poster Board #8

Enhancing Research Training through Empowerment, Resilience, and Civic Engagement

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The UPR – IPERT Program targets undergraduates from a variety of disciplines not traditionally associated with biomedical research and junior faculty from primarily undergraduate institutions within Puerto Rico to increase socioeconomic diversity. The project collaborates with existing groups such as the Yale-CienciaPR network and the NIH-NRMN Program. Key questions the program addresses are : 1) How can more students benefit from biomedical training in PR, especially those who are socio-economically disadvantaged and enrolled in non-traditional Departments? 2) How can they gain competency and credentials in research training when there is a scarcity of research mentors? and 3) How can we create favorable institutional conditions for faculty research mentors and students in the face of economic challenges? Program Activities and strategies developed to address these questions include increasing resilience of students through coaching, increasing mentor to mentee ratio via special research skill courses, promoting the use of web-based research webinars, integrating theater and faculty writing retreats. The poster presentation will showcase some of the most important outcomes of the program so-far, including quantitative and qualitative measures of student success in terms of persistence, graduation rates, but also perseverance, commitment and confidence. The poster will also describe challenges faced by undergraduate students in Puerto Rico as the Island and the Public University (the UPR) in particular is undergoing drastic budget cuts and 200% tuition increase for students, due to severe austerity measures impacting Puerto Rico due to the debt crisis. The poster will outline some of the strategies the UPR- IPERT program has implemented and the adjustments made to address these and other challenges.

SCOARE Project

The SCOARE project is the translational step in an NIGMS-funded research program investigating the role of communication skills in research career development. Our work is grounded in sociolinguistic principles and social cognitive career theory. Evidence from both cross-sectional and national, longitudinal, dyadic surveys of mentors and trainees indicates that trainees' active engagement in SciComm writing, speaking, and presenting as well as their mentors' active mentoring of SciComm predict self-efficacy, science identity, outcome expectations, and ultimately, career intention. The SCOARE project translates those findings into a curriculum for research mentors that equips them with awareness of the impact of communication on research career development and techniques for accelerating their mentoring of these skills. The workshop will be offered at four sites per year for five years, study longitudinal outcomes, and train new facilitators to ensure scalability. The curriculum features techniques for mentoring writing, presenting, and everyday speaking. (Speaking in everyday research conversations is shown by our evidence to be as powerful a predictor as writing.) The mentoring techniques were developed specifically to address the operative social-cognitive factors in our model. With the goal of training 500 mentors, the first round of workshops was completed in January 2019. Our site partners at the four national sites assist in recruitment of workshop participants as well as coordinate on site logistics. Participants at various sites have expressed interest in becoming facilitators, and an online resource bank has been created. Both formative (external) and summative evaluation are being conducted. Summative evaluation is conducted through pre- and post- dyadic outcomes surveys of both participant mentors and their trainees. Formative evaluation results were enthusiastic and expressed need for more hands-on strategies and time to integrate strategies into personal plans. Post-workshop survey data is being collected as of this writing.

IPERT – Poster Board #11

The Impact of a Multi-Institutional Collaboration that Provides Mentorship at the Critical Transitions

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To increase underrepresented scholars' readiness for and success in the research workforce, the Leadership Alliance has developed programming at each stage of the academic pathway. Informed by social cognitive career theory (Lent et al., 1994), we propose that interventions at each transition results in positive changes in trainees' plans to pursue doctoral programs and knowledge of research careers. Through a collaboration between Brown University, Morehouse College, Spelman College, University of Chicago, and Vanderbilt University, we developed and implemented training activities at the critical transitions starting with workshops for first-year undergraduates titled *Creating a Collaborative Learning Group* and *What is Research?* The *Collaborative Learning* workshop showed significant gains in students' skills (69% pre- and 94% postsurvey; $p < 0.05$) and confidence (53% pre- and 88% post-survey; $p < 0.01$) in starting a collaborative learning group. We observed a statistically significant increase in interest in research careers from students who participated in the *What is Research* workshop.

For predoctoral and postdoctoral scholars, our Career Development Workshop showed an increase from 34% (pre-survey) to 85% (post-survey) in respondents who indicated a clear understanding of non-academic careers available in their discipline. Pre and post-surveys further showed an increase from 15% to 95% for how to market themselves for non-academic careers and an increase from 34% to 89% for academic careers.

At the faculty level, grant writing coaching groups provide an opportunity for junior faculty from Minority-Serving Institutions to develop proposals that support their research. Three of the five faculty who participated had successful proposals. Our results collectively provide evidence of effective, longitudinal interventions that increase trainees' self-efficacy and competitiveness as they progress through the academic pathway.

This project is supported by an IPERT award R25GM125707.

Reference:

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Enabling NextGen Advanced Biomedical Leadership (ENABL) via Immersive Training Experiences at Cold Spring Harbor Laboratory

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Practicing scientists, from graduate students and research technicians to tenured independent investigators, often must learn new techniques, paradigms, or even entire subfields as part of their continuing research programs. This need can arise, for example, from rapid advances in experimental technology or a move toward interdisciplinary research questions. When faced with such a need, many scientists learn the new techniques piecemeal from different research groups and centers at their home institutions, a process that can take months. Cold Spring Harbor Laboratory's ENABL program is a cohesive set of advanced research training experiences and ancillary resources that allow practicing scientists to become rapidly and efficiently immersed in a new set of concepts and techniques. The training is composed of in-residence short courses and workshops aimed at graduate students, postdoctoral scholars, and early-career independent investigators. Four of the courses develop laboratory and scientific skills in specific subfields of biomedical research: Antibody Engineering & Phage Display, Single Cell Analysis, Synthetic Biology, and Metabolomics. Two of the courses are focused more on "soft skills" that are needed to succeed in independent research across all fields in biology: the Workshop Leadership in Bioscience and the Scientific Writing Retreat. Each course or workshop is taught by a team of experts who update the curriculum annually in response to new technologies and approaches as well as to evaluation survey responses. The ENABL program also has significant components in dissemination, mentorship, and alumni community building, with the goal of strengthening the professional relationships and networks formed while the courses are in session. Past trainees have credited ENABL courses and workshops with teaching them new scientific skills, stimulating new research directions, and fostering new long-term collaborations, research fellowship opportunities, and mentoring relationships.

T32 Predoctoral – Poster Board #20

ADVANCE: A Transition Program to Graduate School

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Having a sense of belonging increases confidence and performance for students, particularly for those students with imposter syndrome during their academic training. Our mission is to help combat imposter syndrome and other systemic barriers to student success by creating a program that not only recruits and retains students, but also works on developing their personal and multiple identities. Thus, to address this challenge, we created ADVANCE as a holistic development model for underrepresented populations (urp) in the Biosciences. ADVANCE serves as a recruitment and yearlong retention program aimed at increasing the URP population in the Biosciences as well as enhancing a sense of belonging within the Biosciences community. Since the creation of ADVANCE, we've seen an increase in the URM population across the Biosciences as well as a greater sense of belonging and satisfaction amongst students.

Programmatically, ADVANCE has three pillars for student development. Academic, professional development, and community building. These pillars are implemented within the summer component of ADVANCE as well the academic sector.

During the summer, students participate in an 8-week transitional program in which they participate in workshops, social events, network with faculty, and participate in a summer lab rotation, journal club and writing workshop series. During the academic year, students participate in lightning talks, which serves as a mock qualifying exam, movie nights in the school of medicine lounge, and outreach activities both locally, virtually, and nationally.

The directors will highlight program details of ADVANCE as well as best practices developed over the past 5 years and also opportunities for growth.

T32 Predoctoral – Poster Board #24

Management Matters for Scientists

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Motivation: Young investigators running independent labs in today's scientific market face many obstacles. In addition to writing proposals, publishing papers, teaching and service to their school/field, they are also faced with the day to day business of running a lab. More than ever, an understanding of how to lead a lab as a successful organization is essential for young investigators' career and productivity.

Approach: In collaboration with faculty members of the MCO program and Harvard Business School (HBS), we designed an interactive nanocourse called "Management Matters" to cover the following: basic elements of business strategy (Module 1), improving leadership, teamwork, and team management (Module 2), developing effective science communication skills (Module 3), and gaining a deeper understanding of research management and practice in industry through field trips (Module 4).

Outcomes: The 4 modules were scheduled to take place throughout the academic year. We measured the effectiveness of each of the training modules through a detailed evaluation via an online survey instrument. Overall, students found Module 1 very useful and expressed satisfaction with the in-class case study, effectiveness of the instructor, and duration of the module (3-hrs). Module 3 was held in two separate sessions. The long duration and instructor dynamics presented a challenge to some of the students in session 1 (science writing). However, many of the components (duration, in-class assignments, instructor) in session 2 which covered science presentation skills was well received by students. So far, we are finding students are reasonably able to articulate important take-away lessons from each of the modules. Modules 2 and 4 are still in progress.

Sustainability: In order to accommodate more students to attend these important workshops and sustain it in the long run, our plan is to offer a half-day management matters mini conference each year comprised of interactive workshops that would cover important topics in the area.

T32 Predoctoral – Poster Board #27

Evaluation of PhD Student Training in the Biological and Biomedical Sciences

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National funding agencies have been calling for reform of graduate STEM education, and the National Institute of General Medical Sciences (NIGMS) now requires competency-based evaluation plans that assess a well-defined training mission using evidence-based practices. In response to the NIGMS's new predoctoral training grant application (PAR-17-341) the Biological and Biomedical Sciences (BBS) Program at Yale sought to conduct a comprehensive evaluation of its curriculum and training activities. We focused on four departments (Cell Biology, Genetics, Molecular Biophysics & Biochemistry, Molecular, Cellular and Developmental Biology) that will be part of the new Cellular, Molecular and Quantitative Biology Training (CMQB) Program. Over the course of a year, an assessment team met with department stakeholders to collaboratively design an evaluation plan using the Systems Evaluation Protocol (SEP). SEP was developed in 2012 by the Cornell Office for Research on Evaluation and is a standardized procedure providing an evidence-based, innovative methodology for assessing multifaceted programs. Here we describe the evaluation process used during academic year 2018-2019, and portray the outcomes of the modeling on the CMQB program. The assessment process included developing an evaluation plan, building both a logic and a pathway model, identifying gaps in various areas of content delivery and how student learning objectives were being measured, revising existing measurement instruments, generating new surveys to assess trainers and trainees, updating the program's mission and objectives, and identifying processes for continuous improvement. This evaluation process can be used as a framework by other programs to help them conduct evaluations of their own graduate training programs. We will discuss implementation of the new survey tools that were developed for graduate training, and review some of the challenges we encountered in gaining faculty buy-in. Future work includes determining how best to use the data that we will collect to continuously improve the CMQB training program.

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T32 Predoctoral – Poster Board #33

Skills Development for Diverse Scientific Careers B&BS 550b

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Biomedical PhD graduates are pursuing career avenues outside of academia at the highest rate in recent decades. The National Institute of General Medical Sciences offered supplemental funding to T32 predoctoral training grants to expose graduate students to a myriad of biomedical career opportunities, and in 2017, Yale's Combined Program for the Biological and Biomedical Sciences (BBS), first offered a course on 'Skills Development for Diverse Scientific Careers.' This semester-long course is currently running for the second time and addresses career-related topics not covered in any curriculum at Yale: how to run clinical trials both in academia and in pharma; the business and scientific sides of biotech; strategies for optimal professional productivity; how to convert a CV into a resume; and resilience for early career scientists. To assess the impact of the course and whether students are mastering the learning outcomes, a pre- and post-test design is being implemented using Qualtrics. The surveys ask students about their scientific identity development, their current level of confidence in knowing what career options are available, confidence in succeeding in various careers they could pursue, and agreement ratings along various career pathways they are currently interested in investigating (Anderson, 2016; Sinche, 2017). The surveys also address their perceived levels of support from faculty advisors in exploring various career pathways, and whether the course content helped them to identify next steps in their career planning process (Furhmann, 2011; St. Clair, 2017). Finally, we will ask about additional content students want exposure to and any changes they would implement the next time the course runs. This course seeks to encourage students to think broadly about their career options by exposing them to non-traditional biomedical career avenues, and fulfills a gap in current curricular offerings to help prepare students for multiple biomedical science career trajectories.

Sponsored by: Administrative supplement to T32GM007223 and the BBS.

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T32 Supplement – Poster Board #36

Critical Communication Skills for PhD Trainees

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In an environment where professional development is frequently seen as ‘extracurricular’ or ‘extraneous’, it is important for training programs to articulate that effective and successful academic communications includes technical, operational, and interpersonal elements for which graduate students are not formally trained. To that end, we designed a workshop for third year students to address the complicated phase of their training when intellectual, social, and emotional competencies are being challenged. At this point in their career they have begun to present their research at journal clubs, poster sessions, and conferences; they are also beginning to build their professional network and likely to be navigating career-related conversations with advisors and negotiating complex lab relationships. The content of the workshop focused on: 1) clear and confident presentation of posters, slides, and research talks to scientific audiences, and 2) conducting difficult conversations with advisors and peers, including issues of rigor and reproducibility, conflict resolution within the lab environment, and career trajectory.

The workshop was delivered by NIGMS training grant directors and professional development specialists. The course consisted of ten, 1.5-hour group sessions, including two sessions where participants were recorded presenting short scientific talks based on their own research project. Faculty presented sessions related to technical communication of scientific content (slide, poster, and research talk design), while sessions related to interpersonal communications and presentation anxiety were led by staff trained in conflict resolution and career development. Small group work and roleplaying exercises required trainees from dissimilar scientific specializations and cultural backgrounds to engage in discussion and scientific analysis of each other’s scientific content, thereby broadening each trainee’s understanding of disciplines beyond their own. Each session was evaluated by post-event survey, culminating in a final course evaluation discussion that queried the participants’ overall experience of the course and gathered their recommendations for refinement.

General topic: Focusing on Technical, Operational, and Professional Skills Development

T32 Supplement – Poster Board #40

Professional Preparedness in Biotechnology

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The NIGMS aspires to “provide leadership in training the next generation of scientists.” Although current courses in the typical graduate curriculum deliver strategic discipline-based learning for life science and engineering students, the broader biotech and health science industry further demands that scientists be prepared to serve a variety of distinct functions and to understand broader developmental aspects of the business of science and engineering in a professional environment. Many scientists, while experts in their respective fields, have little academic/professional background in business management; i.e. skills that ensure that scientific projects and research are implementable, feasible and sustainable. A T32 supplement through the NIGMS/NIH TWD mechanism allowed us to establish a graduate course entitled, “Professional Preparedness in Biotechnology,” providing practical and professional context and available to a diverse group of students enrolled in various NIH, NSF and DOE programs focused in biotechnology and life sciences. The course works to enhance students’ competitive skills and introduce additional layers of specialized competence enabling immediate contribution within diverse organizations in the biomedical sciences commercial sector. The course is taught by experts in the fields of communications, business management, financial analysis, quality assurance and process management. The syllabus combines didactic instruction with expository case studies, reinforcing key learning as students review and analyze case studies specific to various professional environments and challenges, and present recommendations to the class to seed group discussions and further role-play. At the end of the semester, students present a case study based upon their area of professional interest with analysis of the actions and inactions relative to the concepts taught in class. The course is offered as a permanent component of the Biomedical Engineering and Chemical & Biochemical Engineering graduate programs and, launched in the summer session of 2017, resumes again in summer 2019 with 10-15 students per offering year.

T32 Supplement – Poster Board #41

Developing Professional and Technical Skills for Diverse Career Paths in Biomolecular Pharmacology

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Breathtaking technological advances are rapidly altering the breadth and scope of pharmacology and experimental therapeutics as a research discipline. While the fundamentals of pharmacology have largely remained unchanged, the technologies used in preclinical drug discovery and translational pharmacology have advanced dramatically. Our knowledgebase has expanded with computer modeling, imaging, optogenetics, and many other technologies that are creating permanent changes in the investigational landscape. Next Generation Sequencing (NGS), bioinformatics, neural circuitry, and neural network analysis have enabled a deeper mechanistic understanding of the molecular mechanisms of disease progression in the fields of cancer, cardiovascular and neuroscience research. These advances have led to the development of next generation therapeutics. Consequently, doctoral students in pharmacology must familiarize themselves with an array of techniques. To publish their research in high impact journals and obtain research funding, students must be trained in effective writing and communication skills. To receive strong foundational training and enhance their core technical and professional skills, we propose curricular and administrative revisions to strengthen and enhance our NIGMS T32 Training Program. The overarching goal is to effectively train the next generation of research pharmacologists and to address the gap in skills development that currently exists in pharmacology training programs. As a centerpiece for the revisions, we will develop a new course, Technical and Professional Skills in Pharmacology (TPSP). This course will comprise three independent modules. Module I covers scientific writing and requisite skill sets for students to publish first-authored original research articles. Module II covers experimental design and effective writing of research proposals. Lastly, Module III covers in-depth instruction in computational skills needed to conduct cutting-edge research in pharmacology. Taken together, the new course will provide a broad and holistic educational experience for trainees in the T32 program. Curricular changes will be integrated with ongoing initiatives spearheaded by the BU BEST program. Outcomes will be shared on a national level with both the Graduate Career Consortium and the AAAMC Great Group as a way to share best practices.

T32 Supplement – Poster Board #44

The Development of a New Course titled: Rigorous and Reproducible Design and Data Analysis

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This new course was developed in response to PA-16-060 with the two goals of teaching students in all aspects of life sciences how to computationally analyze datasets and to inculcate best lab practices in experimental design and analysis. Students will learn the computer language R, and use R to analyze datasets from transcriptome, genome, and clinical studies. Students will develop an understanding of sources of bias and the impact of these biases on results and potential conclusions. Examples will be taken from the literature of experimental designs that were rigorous and from examples that had built-in flaws. At the completion of the course, students will have an intermediate level of competency in R and knowledge of how to manage and analyze large datasets. This course has been offered twice in the spring semester, and it will be offered again in the spring of 2020. In the first two years, there were 16 students enrolled in each class. The design was to provide in class opportunities in multiple types of datasets including transcriptomes, genomes, and de-identified clinical data. Different groups of students would analyze the data using different bases of assumptions and compare how results changed. In practice, we were over-ambitious in the number of types of datasets, and we did not need to set different assumptions since analytic programs were highly dependent on setting parameters that were in practice arbitrary and resulting analyses by students were frequently divergent. The in-class datasets in combination with lecture material that outlined each paper as a case-study was successful in developing the desired analytic skills. A lecture on best practices in the wet lab will be expanded in the next offering in the course and will hopefully expand interest in the course among students with lower computational proficiency.

T32 Supplement – Poster Board #48

A Pilot Program to Assess Burnout and Enhance Resilience and Grit in MSTP Students.

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Penn State College of Medicine

Learning Objectives:

- Assess burnout and consider the relationship with the character trait, grit, in MSTP students
- Describe interventions to promote knowledge of and decrease incidence of burnout as well as increased wellness and sense of community.

Medical students, residents, and academic physicians are experiencing higher rates of burnout and dissatisfaction with their careers than ever before. We received an Administrative Supplement to our NIGMS T32 MSTP to develop and implement training to promote resilience, grit, wellness, and a stronger sense of community among our trainees. To achieve this goal, we implemented several new whole group sessions in the context of two additional 1-day retreats and three 1.5 hour evening sessions within the existing professional development curriculum. To assess the intervention, the Copenhagen Burnout Inventory (CBI), Grit Scale, and program evaluations were administered. Electronic surveys collected the validated scales, program evaluation data, level of training, and sex. Responses were anonymous. This study was exempted by the Penn State IRB. The CBI survey was distributed in September 2018 and May 2019, the Grit Scale and program evaluation was administered in May 2019. Descriptive statistics and comparisons of proportions and means were conducted. Overall, 58/58 students responded to at least one of the three surveys (100%), and 31/58 students responded to the CBI survey at both time-points (53.45%). Personal burnout rates were higher for females ($p=.007$) and trended toward highest for G3/4/5 ($p=0.10-0.15$). As only 1/31 students responding to the Grit Scale survey scored ≤ 3 , there was no comparison made between the Grit and CBI surveys. Qualitative analysis of program evaluations elucidated important themes including: the need to establish buy-in from students and faculty; the positive role of the sessions in supporting ‘Community’; the need to focus on all aspects of burnout; and the desire for educational methods (e.g. transformative, social cognitive, adult learning theories) that are aligned with explicit goals. The knowledge and skills necessary to support resilience and grit are crucial to facilitate success among our MSTP students and build sustainability in their careers as physician scientists.

T32 Supplement – Poster Board #54

A Comprehensive Approach to Graduate Training with Integration of Professional Coaching

Steven K. Wendell, Michael J. Forlenza, Patrick J. Pagano

Many creative initiatives continue to be explored for their potential to transform and optimize graduate training. The University of Pittsburgh has a history of developing a variety of individual training components including some based on the underpinnings of International Coach Federation (ICF) accredited professional coaching. While there have been successes with these components in isolation, greater potential may be realized if these components were modified, combined and coordinated. The predoctoral, Pharmacological Sciences Training Program (PSTP), as an early adopter of prior initiatives, is employing this comprehensive training approach with the support of a T32 supplemental award. (T32GM008424-23)

We created a comprehensive graduate training program that incorporates modifications based on our prior experiences and informed by career development theories and coaching models from a broad disciplinary spectrum that would be re-enforced with scholars and mentors across all components.

The primary components include:

- Graduate credit career course (required) - *Foundations of Successful Career Planning and Development* supported with one-on-one professional career development coaching for scholars;
- Mentor training – Core coaching skills to expand their mentoring toolkit and a summary of the critical content that scholars receive in the career course. Supported with one-on-one professional coaching for mentors;
- Career Development Plan (CDP), Annual Self-Assessment, Annual Progress Assessment – modifications of forms and processes to align with the content of the graduate career course;
- Mentor Meeting Reflection Form – An online form for scholars to complete after mentor meetings that is automatically emailed to the scholar and mentor to support clarification of shared understanding, reflection on action items in relation to the parent CDP, re-enforcing concepts such as SDT

Outcomes data including the Career Adapt-Ability Scale (CAAS) and Mentoring Competency Assessment (MCA) will be presented.

T32 Supplement – Poster Board #98

SB220 - Quantitative Measurement and Analysis

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Keywords: Measurements, error analysis, assumptions

We developed the new course “Quantitative Measurement and Analysis”, now a compulsory course for first year Systems Biology Graduate students, and open to all Harvard graduate students. The mission of this course is to impart students with core principles for building an assay, characterizing its performance, and obtaining reproducible and statistically significant results. We believe this training will impact the students’ quality as scientists, and make them better science citizens with the ability to understand and identify assumptions in published data. The course was developed to contain 3 modules: (1) a statistics module that culminates in topics of error propagation, multiple hypothesis testing and an introduction to high-dimensional data analysis, with exercise-driven learning. (2) A biophysics module that introduces physicochemical limits of measurement. (3) An ‘Applications’ module that applies principles from the first two modules to modern techniques. In a final exercise, students analyze an unsolved problem in biological measurement.

The course has run for three years, and we have received consistent positive feedback on the Statistics module, but that the remainder of the class is too hard for some students while too easy for other students. This feedback reflects the diversity of our Systems Biology Graduate Program, which recruits students from biochemistry to pure mathematics. We are now redefining the course as follows: we will partition the class into two halves, a first half being a compulsory statistics course that will cover current topics including estimators, important distributions, error propagation, multiple hypothesis testing, and p-hacking. This will be followed by an optional course aimed at mathematically-minded biologists. Topics will include high-dimensional data analysis, machine learning, and conclude with examples of how biological systems themselves carry out measurements in the face of molecular noise, providing a link between biological systems and the study of measurement and reproducibility.

Doubled Rate of Participation in Mentored Undergraduate Research by Students Who Completed an Alternative, Cross-disciplinary Freshman Laboratory Course

David Julian

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The Cross-Disciplinary Laboratory (X-Lab) program at UF was created to 1) help students develop a synthetic, cross-disciplinary approach to understanding the natural sciences; and 2) provide students with the key theoretical and practical skills necessary to confidently engage in life sciences research as early undergraduates. The X-Lab program is a two-semester alternative to the traditional laboratory courses in general biology, chemistry, and physics, and is now available to all STEM majors at UF. Students who completed the X-Lab program (n=707, "X-Lab students") were compared to UF students from the same majors who completed the traditional laboratory courses in the same years (n=19,314, "control students"). The key measured outcome was whether each student later participated in mentored undergraduate research, as identified by them registering for research as an elective credit in their major. Compared to control students, more X-Lab students identified as Asian (1.3x), Black (1.2x, not sig.), Hispanic (1.1x, not sig.), and fewer identified as White (0.83x) and male (0.82x). We found that X-Lab students were 2.8x as likely to participate in research compared to control students (56% vs. 20%). This effect was significant regardless of race/ethnicity and gender, although the magnitude of the effect on research participation varied (2.5x for Asian, 2.7x for Black, 2.2x for Hispanic, 3.2x for White, 2.5x for females, and 3.2x for males). The control students and X-Lab students were otherwise similar, based on AP scores and math preparedness, and their grades in the "lecture" courses in general biology, chemistry, and physics were comparable. Although the X-Lab students were self-selected (i.e., this was not a randomized design), the results indicate that integration of a research skills approach to into the freshman laboratory courses may significantly increase the probability of students seeking out mentored undergraduate research experiences in their subsequent undergraduate years.

MARC U*STAR – Poster Board #60

Facilitating the Development of Science Communication Skills in a Group of MARC U*STAR Trainees

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Science communication is key to student success in STEM. However, it is not a significant component of traditional undergraduate STEM curricula. This gap in STEM education may have a disproportionate negative impact on students with limited access to extracurricular resources to improve their science communication skills. Here we describe efforts to address this gap at Purchase College, SUNY. Over the course of two semesters, we engaged a group of MARC U*STAR trainees in activities centered on scientific reading, data interpretation, writing, and oral communication. Activities focused on (1) reading scientific papers; (2) interpreting published data; (3) writing abstracts; (4) creating posters; (5) giving oral presentations; and (6) writing personal statements for summer research and PhD programs. Despite their overall strong academic backgrounds (mean GPA >3.5), trainees' skill levels in these six areas varied widely at the beginning of the first semester. However, trainees showed marked improvement over the course of two semesters, especially in the areas of writing and oral presentations. This suggests that (1) academic performance in traditional STEM curricula is a poor predictor of science communication ability and (2) there is a need for extracurricular support for science communication skills development at the undergraduate level.

MARC U*STAR – Poster Board #62

Recruitment of High-Achieving Native American Students to an NIH-MARC U-STAR Program

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At Fort Lewis College, over 38% of students are Native American representing 173 American Indian tribes and Native Alaskan villages. Although the population of Native American students eligible for our campus NIH-MARC U-STAR program is potentially high, the number of applications from qualified and high-achieving students to the program have been historically low. To increase the number of potential applicants to the program, we have instituted several program initiatives to accomplish the following goals: 1) raise the campus profile of the MARC Program; 2) motivate and encourage students to pursue a career path in biomedical research; and 3) provide support and mentoring of potential MARC scholars to increase their competitiveness for a successful application. Some effective initiatives and programs include annual attendance at the SACNAS National Meeting by our Native American students and program director, recruitment of motivated and dedicated MARC Faculty Mentors, an annual poster presentation and symposium featuring current and potential MARC scholars, and campus visits and seminars from prominent Native American scholars. In 2019, we had a record number of applications from Native American students and our current cohort of 6 MARC scholars all self-identify as Native American. Several years of student surveys by our external evaluator indicate that our students feel supported, encouraged, and empowered by their experience as MARC scholars. We have also learned that many of our Native American students face unique cultural challenges that may require additional support to ensure a positive experience as a MARC scholar. Our sustained efforts have led to successful matriculation by our graduating MARC scholars to top graduate programs in the biomedical sciences. The current and sustained achievements of our MARC scholars will allow us to continue to encourage and recruit outstanding Native American students to apply to become a MARC scholar.

MARC T36 – Poster Board #63

FASEB Postdoctoral Preparation Institute: Preparing Trainees for a Broad Range of Career Options and Transitions

B. Drehman¹, C. Gardner², J. Roberts¹ and E. Rosa-Molinar^{1,3}

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Abstract: Coming Soon!

PREP – Poster Board #68

Facilitating PREP Post-baccalaureate and IMSD Pre-doctoral Near-peer Student Interactions: Lessons Learned

Cynthia F. Wright¹, Suzanne Hennigan¹ and Laura M. Kasman¹

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The Medical University of South Carolina is an academic medical center with a total average PhD in Biomedical Sciences enrollment of 180 students. Our pre-doctoral IMSD program has been active for 15 years, with a strong record of increasing PhD attainment rates among underrepresented groups. When designing our post-baccalaureate research education program (PREP) five years ago we sought to bring benefit to both programs by designing activities in which the two groups of scholars would interact. Our initial approach was to include PREP scholars as peers in all IMSD professional development monthly meetings, and to appoint an IMSD scholar to our PREP Steering Committee. We expected PREP Scholars to benefit from the simulation of a first-year graduate school experience by participating in events with near peers, and the IMSD scholars to benefit from the opportunity to mentor PREP scholars, thereby increasing their self-confidence^{1,2}. In subsequent years we introduced structured peer pairing. Outcomes were determined by survey, focus groups, participation rates, and faculty observation. IMSD scholars who served on the PREP Steering committee were active and involved members. IMSD students also actively engaged in activities where they provided input to PREP scholars as they prepared for presentations. However, joint IMSD-PREP group activities did not result in the expected benefits. Structured mentor-mentee events were more effective. **Lessons learned:** Proximity and group activities alone did not appear to foster beneficial interactions or confidence building. Both post-bac and pre-doctoral scholars reported and/or appeared to have more benefit from structured activities with defined mentor-mentee roles and assignments. Scholars in both programs also benefited from group meetings focused solely on the individual programs.

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1. Increasing STEM success: a near-peer mentoring program in the physical sciences. Anna M. Zaniewski and Daniel Reinholz. *International Journal of STEM Education* 2016 3:14.
2. Near-peer STEM Mentoring Offers Unexpected Benefits for Mentors from Traditionally Underrepresented Backgrounds. Gloriana Trujillo, Pauline G. Aguinaldo, Chelsie Anderson, Julian Bustamante, Diego R. Gelsinger, Maria J. Pastor, Jeanette Wright, Leticia Márquez-Magaña, and Blake Riggs. *Perspect Undergrad Res Mentor*. 2015; 4(1). PMID: 27668127

Bridges BS – Poster Board #69

Student Success Driven by a Summer Enrichment Program for the Pathways to Advanced Degrees in the Life Sciences

Benjamin L. Clarke¹

¹University of Minnesota, Duluth

The Pathways to Advanced Degrees in the Life Sciences promotes research careers to undergraduate students. Three schools participated in PADLS (2009-2019): the University of Minnesota Duluth granting the BA/BS, partnering with two AA granting institutions: Lake Superior College (Duluth MN) and Fond du Lac Tribal and Community College (Cloquet MN). Students from northern Minnesota comprise a mix of low-income, first generation, Native American, African American and Hispanic/Latino students coming from small urban and rural communities. Students entered a 2-4 year pipeline to obtain baccalaureate degrees. Participation in a 10-week academic enrichment program provided seamless entry into UMD research laboratories at the Medical School, Swenson College of Science and Engineering, and the Natural Resources Research Institute. Program core curricula included team-science projects, a book club, and workshops on problem-based learning called critical concepts, student success presented by an Educational Psychologist, public speaking, and responsible conduct in research. These activities were designed to 1) promote collaboration and refine bench skills; 2) enhance reading comprehension; 3) learn hypothesis building and prioritizing ideas; 4) develop professionalism; 5) hone communication and debating skills, and 6) practice ethical norms in their careers. University faculty and post-doctoral fellows gave presentations on research and career paths. Trainees presented articles from potential research faculty-mentor in a journal club. Participants comprised 51 from community college in a Bridges to the Baccalaureate, and 60 university students in a Baccalaureate IMSD. The Bridges Program graduated 43 students with an AA and the Pathways Program (IMSD) graduated 49 students with a BA/BS. Outcomes for training was 17 MS, 18 PhD and 12 in professional degrees of pharmacy, medicine, nursing, education and law. The application of active learning methods generated student confidence, promoted perseverance to sustain their academic progress, and inspiration to proceed into advanced degrees and research careers.

Bridges PhD – Poster Board #77

Group Mentoring at a Distance: Videoconferencing to Promote Deaf Scholar Resilience, Persistence, Retention, and Success

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Motivation: Aspiring Deaf and hard-of-hearing (DHH) scientists often navigate biomedical doctoral training in programs that do not provide DHH peers and role models. This experience can be lonely and frustrating and can negatively impact scholar resilience, persistence, retention, and success. Many Rochester Bridges to the Doctorate (RB2D) alumni have matriculated to biomedical science doctoral programs and found it difficult to thrive as the sole DHH student.

Approach: To address the lack of a critical mass of DHH scholars at different universities, the RB2D program has developed a virtual community (Deaf Scientist Time-DST). RB2D scholars, alumni, and DHH students from other universities videoconference monthly. The video modality is essential for visual communication (e.g., sign language) amongst DHH participants, and also promotes interpersonal connections. DHH faculty facilitate the meetings, which begin with a check-in to see how the scholars are doing and to address any urgent challenges. Each meeting has an additional specific goal, such as allowing participants to practice conference presentations for feedback, or learning effective survival strategies from more seasoned deaf scientists.

Outcomes: The first meeting included 10 DHH participants from five different sites. Participants shared that they are thrilled this resource is available and have excitedly offered potential topics for future meetings. We plan mixed methods (survey and interviews) to assess this new program and inform improvements. We believe that as more DHH scholars learn about this open virtual meeting, there will be greater participation and ultimately a critical mass of DHH aspiring scientists to network and support each other.

Lessons Learned: This virtual community was enthusiastically received by DHH participants, and is a promising approach to address isolation, promote community building, and foster persistence and success. This model likely has applications with other groups that are underrepresented in biomedical research fields.

IMSD – Poster Board #79

Training Effective Undergraduate Peer Mentors: An Intervention to Increase Student Success among UR STEM Mentees while Providing Significant Benefits to Mentors

Brian Booton¹, Mark Hannink¹, and Linda Blockus¹

¹University of Missouri-Columbia

This poster will outline an effective peer mentoring model for the mentorship of UR undergraduate STEM majors participating in the University of Missouri's NIGMS IMSD program. This innovative peer mentoring program has resulted in the growth and success of our IMSD trainees, as well as yielding significant learning outcomes for the peer mentors. In the past ten years, our program has grown from 20 to 80 participants. We utilize a cadre of eight trained upper-class peer mentors who meet weekly with our approximately 60 incoming freshmen, sophomores and transfer participants. The specifics of the peer mentor training will be discussed including selection, responsibilities, a three-day training retreat, and 30 weeks of on-going weekly professional development workshops. Our peer mentors assist mentees with acclimating to the university, achieving academic success, identifying and interviewing for research lab positions, as well as maximizing one's undergraduate research experience. Developing the desired competencies and skills needed for this role requires strategic training exercises and ongoing preparation to boost the Peer Mentors' effectiveness. Training workshops have been curated and developed that focus on personal reflection and listening skills, as well as employing best practices when advising and coaching students. Peer mentors also participate in our comprehensive IMSD program that integrates research, faculty mentoring, academic and social support, and professional development to prepare students to matriculate into graduate doctoral and medical/doctoral programs. Evidence of this successful intervention has been shown in focus group and external evaluator reports, student feedback, and success of our students entering summer research and graduate programs. With limited funding available to support professional program staff and varying demands of faculty at a research university, we have honed the peer mentor training to expand, strengthen, and enhance our IMSD program, while making the professional development aspect a defining leadership experience for the peer mentors.

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IMSD – Poster Board #81

Facilitating PREP Post-baccalaureate and IMSD Pre-doctoral Near-peer Student Interactions: Lessons Learned

Cynthia F. Wright¹, Suzanne Hennigan¹ and Laura M. Kasman¹

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The Medical University of South Carolina is an academic medical center with a total average PhD in Biomedical Sciences enrollment of 180 students. Our pre-doctoral IMSD program has been active for 15 years, with a strong record of increasing PhD attainment rates among underrepresented groups. When designing our post-baccalaureate research education program (PREP) five years ago we sought to bring benefit to both programs by designing activities in which the two groups of scholars would interact. Our initial approach was to include PREP scholars as peers in all IMSD professional development monthly meetings, and to appoint an IMSD scholar to our PREP Steering Committee. We expected PREP Scholars to benefit from the simulation of a first-year graduate school experience by participating in events with near peers, and the IMSD scholars to benefit from the opportunity to mentor PREP scholars, thereby increasing their self-confidence^{1,2}. In subsequent years we introduced structured peer pairing. Outcomes were determined by survey, focus groups, participation rates, and faculty observation. IMSD scholars who served on the PREP Steering committee were active and involved members. IMSD students also actively engaged in activities where they provided input to PREP scholars as they prepared for presentations. However, joint IMSD-PREP group activities did not result in the expected benefits. Structured mentor-mentee events were more effective. **Lessons learned:** Proximity and group activities alone did not appear to foster beneficial interactions or confidence building. Both post-bac and pre-doctoral scholars reported and/or appeared to have more benefit from structured activities with defined mentor-mentee roles and assignments. Scholars in both programs also benefited from group meetings focused solely on the individual programs.

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IMSD – Poster Board #82

Peer Mentor Training for Mentoring PREP and IMSD Trainees

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Effective mentorship can promote increased self-efficacy and productivity. These attributes are necessary for the retention of students underrepresented in science and medicine to diversify the biomedical workforce. However, professional development to improve mentoring skills is not always available to those who would most benefit. Graduate students and postdoctoral trainees are routinely assigned to supervise PREP and IMSD trainees. Although mentor training is open to faculty at Baylor College of Medicine, there is no institutional guidance or training provided for trainee members assigned to mentor new members in a lab. To meet this need, we offered NRMN (National Research Mentoring Network) mentor training to the 2018-2019 cohort of PREP and IMSD peer mentors. We provided six training modules in two 2-hour workshops—*Maintaining Effective Communication, Aligning Expectations, and Assessing Understanding* in the Fall, and *Promoting Self-Efficacy, Addressing Equity and Inclusion, and Fostering Independence* in the Spring. Twenty-three (23) mentors attended the Fall workshop, and 12 returned for the Spring workshop. The NRMN evaluation team evaluated the workshops' effectiveness. We will report the results that overall the peer mentors found the training was a valuable use of their time and that it increased their confidence to be peer mentors for the PREP and IMSD trainees effectively. Additionally, through this process, our four NRMN-trained facilitators gained experience through leading and observation to expand the workshop offerings to other populations and pilot new modules in the next year.

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Creating and Implementing a Communication Plan for the NIH/NIGMS/TWDD Research Training Programs at Virginia Commonwealth University (VCU)

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In 2010, the VCU Center on Health Disparities (COHD) initiated 3 NIH/NIGMS/TWDD research training programs, supporting undergraduates, postbaccalaureates, PhD students and postdoctoral fellows. These programs increase the number of scholars from underrepresented groups that enter biomedical and biobehavioral science careers. An improved communication plan was required to reach a growing and complex web of stakeholders, including >40 current trainees, >100 alumni, >75 research mentors, applicants, and VCU leaders. The plan's purpose is to highlight major trainee and program accomplishments, and the favorable position of the programs for continued success and expansion. The goals include: to facilitate networking of current trainees with alumni and near peers, to recruit candidates, to educate VCU faculty and administrative colleagues about the programs' value, and to maintain and expand fiscal and other support. Consultation with VCU communication experts allowed design of a plan that emphasizes the strengths and uniqueness of the COHD training programs, and the successes of individual trainees to put a face on the programs. Thus far, a LinkedIn group was created with >80 current and alumni trainee members. In addition, a slide show of trainee photos and successes was prepared and presented at the VCU 50-year anniversary symposium. Seven mentoring groups with trainees at all levels were created. An annual alumni and trainee networking event was instituted and well-attended. A new NCI proposal to expand the number of underrepresented trainees impacted was submitted. Immediate measurable results include the number of meetings of mentoring groups, number of alumni meetings with trainees, number of trainees getting jobs or applying to programs under advice of alumni, number of applicants, and the number of new mentors recruited. Ultimately, the impact of the plan will be measured by renewal of the grants, funding of new proposals, increased participation by faculty mentors, and continued support by VCU administration.

RISE – Poster Board #87

Promoting Team Building, Collaboration and Communication Skills in Graduate Students through Interactive Scientific Retreats

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Graduate students in the biomedical sciences receive intensive training in their scientific area. Tools to help them find balance between work and personal life are still needed to ensure a successful graduate experience. Based on student feedback, we developed an off-site yearly retreat focused on enhancing students' 'soft skills' and professionalism in a less formal atmosphere. **Aim:** To promote team building, improve collaborations and enhance communication skills.

Approach: Retreat themes of "Who am I?", "Leadership: A path to independence", "Assertive Communication: key to success", "Career Diversity", "Science and Wellness" and "How to become a Science Ambassador" were addressed through short presentations, case studies, live podcast, webinars, focus groups, role play, and breakout sessions with various team building exercises to practice communication skills, and identify abilities, knowledge, values and behaviors. Prior to the retreat, participants were provided with relevant articles, books and case studies. Team building exercises and interactive activities accompanied the sessions. Guest speakers with expertise in the retreat theme participated in discussion sessions with the students. Evaluations were completed by all trainees. **Outcomes:** Over the past 6 years, a total of 32 trainees, 9 RISE Program faculty and staff, and 15 external speakers from industry, academia, media/journalism, the arts, psychology and holistic medical fields participated. 100% of the participants agreed the experience was productive and beneficial, with a good balance between talks and hands-on activities. Trainees stated that the retreats allowed them to gain a better perspective of their strengths/weaknesses, how they 'fit' into the RISE community, and provided them with the motivation and inspiration to reach their scientific and personal goals.

Conclusions: Off-site interactive science-related retreats are a valuable tool for enhancing soft skills and sense of team identity in a biomedical sciences graduate program, while covering important issues related to pursuing a career in science.

Supported by R25GM082406