PURM
Perspectives on Undergraduate
Research & Mentoring

Development of an Engaging and Inclusive Undergraduate Virtual Research Mentoring Model

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Introduction

Challenges of Virtual Research Mentoring

Undergraduate research is a commonly recognized high impact educational practice (HIEP) (Kuh, 2008), but as with any HIEP, there is a strong need for it to be of high quality for greatest gains and successes for both the faculty member and students (Kuh & O'Donnell, 2013). One of the key features of a high-quality HIEP is appropriate and strong mentorship (Shanahan, 2018; Walkington et al., 2020). One key characteristic of this type of mentoring can be attention to best practices (Shanahan, 2018; Walkington et al., 2020). Shanahan and colleagues have helped identify ten salient practices that provide both instrumental and relational mentoring of research projects (Hall et al., 2023). This framework has been utilized in a number of contexts, such as global (Allocco et al., 2022), co-mentoring (Ketcham et al., 2018; Ketcham et al., 2017), and virtual (Hall et al., 2021) mentoring relationships.

In a study of award-winning undergraduate research mentors, the mentors believed that the future of undergraduate research would be through the democratization of research to underrepresented students and to majority-identity students (Shanahan et al., 2017). They also identified that this democratization would happen through curriculum and technology. Increasingly, there are more research studies and initiatives to center virtual mentoring as a way to increase participation and access to undergraduate research experiences and help provide equitable experiences to students who might not typically have access (see Coleman et al., 2022 for various example case studies) (*Undergraduate Research in Online, Virtual, and Hybrid Courses*, 2022).

The COVID-19 pandemic accelerated the need for embracing innovative mentoring methods, including virtual mentoring, due to the barriers imposed by the pandemic environment which limited in-person interactions and traditional face-to-face mentoring settings. What just a few years ago might have been theoretical or more long-term mentoring paradigm shifts very quickly became necessities. Further, inclusivity and equity in accessing high-quality mentoring remains tantamount to equitizing research mentoring for underrepresented and minoritized students (Finley & McNair, 2013; Pierszalowski et al., 2018). Virtual mentorship has emerged as a solution to inclusivity and equitychallenges and offers a high-impact alternative for crucial student research engagement. However, best practices for engaging in virtual research mentoring, for both mentors and mentees, are untested or unknown.

Virtual Research Mentoring Model (VRMM)

The goal of the pilot Virtual Research Mentoring Model (VRRM) workshop was to test a pedagogical framework intended to provide faculty and students with the opportunity to learn more about research mentorship overall and to work in teams to design innovative programs to foster meaningful virtual research mentoring relationships, particularly within the context of increasing diversity, equity and inclusivity within a mentoring experience. As a 14-member consortium of higher education institutions, the CAA Academic Alliance holds a unique position in supporting and promoting the dissemination of the novel pilot concept.

Diversity, equity and inclusivity are all pillars of the CAA Academic Alliance's strategic priorities and are also wholly represented in the strategic plans of each HEI member of the Alliance. The VRMM pilot represents the culmination of an intentional strategy to increase diversity, equity and inclusivity in both mentor and mentee communities, as well as to further promote collaboration and innovation within the research enterprise. If successful, the intention is to expand the VRMM model in Summer 2024 with a larger workshop of up to 14 higher education institutions and completely open sharing of the model beyond that.

To help participants unpack challenges related to mentoring in general and virtual mentoring in particular, we provided participants with an overview of design thinking and the design process and then coached them through a design challenge, or rapid design process event. Design thinking, also referred to as human-centered design, is a useful process and mindset for collaboratively working to analyze, unpack, and generate innovative solutions to messy and complex problems (Brown, 2008; Panke, 2019; Razzouk & Shute, 2012). Originating in engineering, applications have spread to business management and various higher education fields and settings such as public administration and health professions education (Beligatamulla et al., 2019; McLaughlin et al., 2019; Miller, 2017; Van Buuren et al., 2020). This interest is likely due to design thinking's usefulness in allowing educators to teach problem-solving and teamwork skills while also allowing students to wrestle with messy problems and develop creative solutions (Beligatamulla et al., 2019); (Panke, 2019). While the results will depend on the settings and specific learning objectives, common outcomes related to engaging design thinking in education settings include improvements in collaboration skills and problem-solving ability, increases in empathy and creative confidence, and reductions in cognitive bias (Beligatamulla et al., 2019; McLaughlin et al., 2019; Panke, 2019). Educators have also found the design process to be useful in developing new curriculum and programs (Panke, 2019). Importantly, in recent years, educators have begun to implement design thinking approaches to help redesign curriculum and policies to meet the needs of a post COVID-19 world and with a focus on equity and inclusion (Culver et al., 2021; Vaugh et al., 2020).

This paper describes the structure, delivery, and key findings from an intensive two-day design challenge, the VRMM pilot workshop, focused on creating implementable solutions to the challenges of virtual research mentoring. Diversity, equity, and inclusion were considered throughout the design process and outcomes of importance as the implementation of virtual mentorship of research is believed to be one way to democratize undergraduate research. A robust discussion is provided in this paper as a result of those considerations and conversations. The framework of a virtual research mentoring toolkit was also developed and is being disseminated concurrently with this paper.

Methods

## Enhancing Research for Online Learners (EnROLL) Program

The VRMM pilot workshop was developed as a collaborative effort between the University of North Carolina Wilmington (UNCW), Elon University (Elon), North Carolina Agricultural and Technical State University (NC A&T), and the CAA Academic Alliance. The CAA Academic Alliance, a 14-insititution consortium created in 2002 and composed of members from the Coastal Athletic Association, is

dedicated to promoting research mentorship opportunities and experiential learning in scholarship training for all students enrolled at CAA institutions. One of the CAA Academic Alliance's key programming initiatives is the Innovate/Collaborate (IN/CO) grant program, which provides seed funding for multi-institutional research project collaborations. UNCW, Elon, and NC A&T were awarded a Round Three IN/CO grant in 2022, with UNCW as the lead institution and Dr. Peterson as the principal investigator, developing the EnROLL program as an outcome of the IN/CO award.

The overarching objective of the EnROLL Program is to leverage online, distance education learning technology and academic partners to enable the involvement of health sciences distance learners in interdisciplinary, faculty-led research. The project also focuses on attracting and engaging underserved and minoritized undergraduate students in health research training by partnering with graduate students and faculty mentors. The program has three primary aims: 1) to develop a focused program and curriculum in faculty-led research to engage online graduate and underserved undergraduate students in health research; 2) to develop and implement an effective model of research mentor training for dissemination; and 3) to assess value in the program as a long-term sustainable model to engage students in faculty-led research.

To achieve the above aims, the EnROLL program has a series of deliverables either completed, in process, or planned for academic years 2022 through 2024. Figure 1 outlines how the deliverables integrate in achieving the program aims. Of particular relevance to this report are the development and delivery of 'hackathons,' or design challenges focused on issues surrounding higher education and their communities at large, and the dissemination of mentoring training modules.

Figure 1. *EnROLL Program Model Depicting Project Aims and Deliverables.*
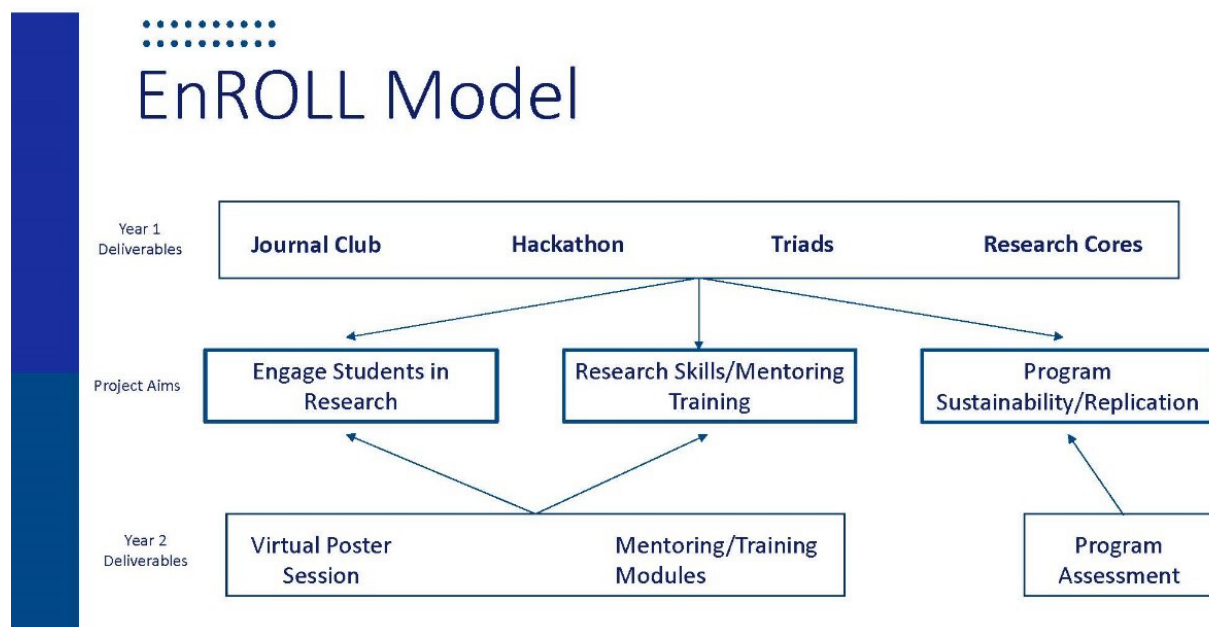
VRMM Pilot Workshop Approach

To promote high-quality mentorship, the CAA Academic Alliance invited faculty and students from three CAA conference institutions, UNCW, Elon, and NC A&T, to the VRMM pilot event. The three participating institutions are all located in North Carolina, yet represent diversity in higher education institutional settings (Table 1). UNCW and NC A&T are both public universities, and part of the multi-campus UNC university system, while Elon is private. The three universities employ collectively more than 7,800 faculty and staff, and offer a combined total of 300+ degree programs. Elon and NC A&T

were both founded more than 133 years ago (1889 and 1890, respectively), while UNCW was founded in 1947. All three institutions emphasize experiential learning and student-focused research opportunities. Both NC A&T and UNCW are R2 Carnegie classification institutions, indicating a high-level of research activity, and Elon is considered a Doctoral/Professional University. NC A&T is the largest HBCU in the United States and a land grant university, as designated in the Morrill Act of 1890.

Table 1. *VRMM Institutional Participant Overview.*

Institution	Type	Setting	Enrollment	Carnegie Index
Elon	Private	Suburban	7,100	Doctoral/Professional
NC A&T	Public	Urban	13,500	R2
UNCW	Public	Coastal	18,000	R2

More than two dozen participants gathered in June 2023 on campus at UNCW, as well as virtually via video conferencing from across the country, to brainstorm about virtual mentoring. Participants and facilitators were all experienced in mentorship as either a mentee, mentor, or both prior to the event. The facilitator team reflected a broad cross-section of scholarship and skills, with faculty from the fields of Clinical Research, Social Work, Geriatrics, and Exercise Science. Further, the facilitation team provided expertise in several key evidence-based curriculums: District C (design thinking), CIMER (Center for the Improvement for Mentored Experiences in Research), "Managing Mentoring Relationships," and Motivational Interviewing. Participants in the event were 62.5% students and 37.5% faculty, and most participating students were undergraduates (90%).. Faculty participants were from all three academic rankings, with 106 years of combined mentoring experience, as reflected in the pre-event survey (Table 2). Interestingly, nearly three-fourths of the group (71.4%) represented the field of Exercise Science and more than half (57.1%) indicated backgrounds or goals in community health outcomes.

Table 2. *VRMM Event Participant Descriptive Overview*.

Total participants	Students	Faculty
N=16	*N=10*	*N=6*
Institution		
Elon	5	3
NC A&T	1	1
UNCW	4	2
Student Level		
UG	9	
Grad	1	
Faculty Level		
Assist. Prof.		1
Assoc. Prof.		2
Professor		3
Faculty Mentoring Experience		
4-10 years		1
11-20 years		3
20+ years		2

Design Challenge

The design challenge model is adapted from the design thinking process developed by the Hasso Plattner Institute of Design at Stanford (also known as the "Standford d.school") and modified for education settings by District C, an education-focused non-profit (District C, 2023; Hasso Plattner, n.d.). The Standford d.school design model is a five-step process that helps teams move from a general problem to a new, specific definition of the problem and a creative solution to that problem. While the steps are presented linearly, the design process is iterative and often far from straightforward. In the first step, *Empathize/Understand*, teams learn about the problem and the needs of the user or group for which they will be designing. In the second step, *Define*, teams synthesize this information and develop a new, more specific definition of the problem. Based on this new definition, teams move to the third step, *Ideate*, and brainstorm solutions. Teams once again synthesize information and select a key idea or ideas to develop into *Prototype* in the fourth step. The final step, *Test*, involves pitching or testing their solution and getting feedback (Hasso Plattner, n.d.). To help educators guide students through the design process, District C has developed a pedagogy model that focuses on helping educators learn how to coach student teams as the teams work with and design solutions for real organizations. The District C model emphasizes using specific design tools and activities, such as mind mapping, within the five steps to help students develop their teamwork, critical thinking, and creative problem-solving skills (District C, 2023).

Drawing on the Standford d.school model and District C's approach, we developed and implemented a day and half-long design challenge or sprint to generate creative ideas around how to improve virtual research mentoring. Prior to the event, participants were given some background information on research mentorship and two broad challenge statements that they then addressed during the event: "What curriculum or other educational resources are available or could be developed and implemented for CAA institutions of higher learning to facilitate and encourage virtual research mentorship?" and "What are the specific details and considerations that would make a virtual mentoring experience most successful?".

At the start of the event, participants were introduced to teammates and completed a team-building activity with the effective communication styles inventory. After teams were established, they were introduced to the concept of design thinking and the process they would go through during the event. We talked with teams about the mindsets we would be developing and the tools we would be using as they moved through the design process. After setting the stage, teams moved into the first phase of the design process, *Empathize*, and heard from subject matter experts about opportunities, needs, and motivations related to research mentorship in traditional and virtual settings. Teams then had the opportunity to ask the experts questions and dig deeper into the challenge. Like the District C model, all the teams were involved in this Q&A so that they could learn from the other teams and the subject matter experts. After gathering information from the first stage and comparing it to their own knowledge and experiences, teams were led through a series of activities during the *Define* stage to help them synthesize this information and create a new," more specific problem statement based on a key insight they identified (See Figure 2). Drawing on the District C format, after the teams had their key insight and new problem statement, they had the opportunity to talk with our subject matter experts again to gain more insight and clarify their ideas. As before, this was done in an open Q&A format so that teams could also learn from each other. After talking with the subject matter experts, teams were led through a series of individual and team brainstorming activities during the *Ideate* phase. As they moved into the *Prototype* phase, teams drew on different decision-making tools, such as a decision matrix, to help them decide on the idea that they would develop into their prototype. Once they decided on their solution, teams were given time to develop sketches and simple mock-ups of their solution. For the final step, *Test*, teams were provided with a three-slide template and asked to explain how they got to their key insight or new problem and then what

their solution was and how it would work. The half-day of the event was dedicated to pitching solutions and responding to audience feedback in a Q&A format.

Facilitators were invited to the group as subject matter experts on mentorship, undergraduate research mentorship, virtual mentoring methods, and inclusivity, equity and accessibility considerations. In the VRMM event, participants worked in multidisciplinary teams of three or four, with multiple institutions represented on each team. Each team was given the same challenge: to create innovative solutions to the stated design problem, while networking and building connections with participants and facilitators.

Participants joined the session both traditionally, in person and on campus in Wilmington, NC, and from across the nation by virtual meeting platform (Zoom). One team was a hybrid combination of in person and on Zoom. Each team worked together to generate ideas in a design challenge format: a low-fidelity, solutions-based charrette. Speed of creation and simplicity of design are two integral properties of low fidelity design. Each VRMM event team pitched their unique solutions at the end of the two-day workshop.

Data Collection and Analysis

A pre-event survey was distributed electronically (Qualtrics International Inc., Provo, UT) to all registered attendees. Survey questions focused on experience, interest, and level of comfort with virtual mentoring. Other data collected included student or faculty year or rank, respectively. Participants were asked to respond to questions about virtual mentoring again, post-event.. Data were summarized using appropriate descriptive statistics (count and frequency). Open-ended questions were also asked as part of a post-event debriefing session with workshop participants. The UNCW Institutional Review Board determined that this work was non-human subjects research.

Results

While all the participants had experience in research mentoring, less than half (43.7%) had utilized virtual mentoring as a tool in their mentoring engagement prior to the VRMM event (Table 3). After the event, nearly every participant (92.9%) expressed they would be utilizing virtual mentoring in all future mentoring experiences, with 100% of students expressing they would seek options to include virtual mentoring in their future mentee roles. Furthermore, the post-event survey data revealed that about three-fourths of the participants (76.9%) stated feeling some comfort with virtual mentoring prior to the event, with nearly everyone (92.9%) responding that they felt completely comfortable with the concept after attending VRMM.

Table 3. *VRMM Participant Survey Response Overview*.

Participants	N=16	
VRMM Survey Tool	*Pre*	*Post*
Using virtual mentoring/students	*Yes – 40.0%*	*Yes – 88.9%*
Using virtual mentoring/faculty	*Yes – 50.0%*	*Yes – 100.0%*
Comfort level with virtual mentoring/students	*Somewhat or very – 76.9%*	*Somewhat or very – 90.0%*
Comfort level with virtual mentoring/faculty	*Somewhat or very – 83.3%*	*Somewhat or very – 100.0%*

Most surprisingly, despite the focus on virtual mentoring and potential technological barriers, the key insight for teams was decidedly analog: how to develop and maintain meaningful connections and relationships. This theme was reflected in both the new problem statements they developed and the

solutions they envisioned. For example, as seen in their mind map below (Figure 2), one team zoomed in on the challenges of developing and maintaining authentic relationships in a virtual setting. Their prototype or solution to this problem was named "Bridging Worlds" and included the development of a survey that would be taken by both the mentor and mentee. The aim of the survey was to help the mentor and mentee learn about each other as researchers and people with questions meant to spark deeper conversations. Example questions for the mentee included "What are you hoping to accomplish or get out of conducting research?" and "Are there any interests that you have outside of the classroom that you would be comfortable sharing?" Example questions for the mentor included "How would you describe yourself as a mentor?" and "What are some hobbies or interests outside academics that interest you?" A second team had a similar approach with survey questions that would help mentors and mentees learn more about each other's communication styles, working styles and expectations, and short and long-term goals.

While the other two teams also focused on relationships, their solutions focused more on the tools, resources, and training that would help mentors develop and maintain a meaningful relationship with mentees. For example, one team noted that many mentors lack formal training or spaces to talk about mentoring with colleagues. Their prototype and solution to this problem was named "Building Meaningful Mentor-Mentee Relationships in a Virtual Environment" and outlined a workshop series. Key aspects of the series would include developing skills around effective communication and engagement in general and in virtual spaces, sample activities that mentors could use to build relationships, and a virtual or in-person café or space for ongoing discussions or sharing of mentoring experiences. Similarly, the fourth team also focused on trainings and tools to help mentors. They suggested the development of a virtual toolbox that would provide resources and training around areas such as using motivational interviewing, the benefits of and how to build diverse research labs, and ideas for how to better support students to learn about research labs and opportunities.

A post-event debriefing with participants also yielded important feedback. Open ended questions included:

- What did you love?
- What did you lack?
- What did you learn?
- What did you long for?

Overall, faculty also expressed that utilizing tools as discussed in the VRMM event, such as Motivational Interviewing techniques, along with more collaborative mentor/mentee matching processes, could yield tremendous results. Many participants also described the recognized need for strong interpersonal mentorship relationships prior to 2020, with the pandemic environment only exacerbating the need to elevate their cultivation to greater priority. While institutional acceptance of virtual mentoring may be an initial concern for achieving full implementation, requiring systemic policy change to thrive, the rewards—and long-term student success benefits—indicate that such changes merit serious consideration.

Figure 2. *Mind Map: Team Badger VRMM Pilot Workshop, June 8-9, 2023.*
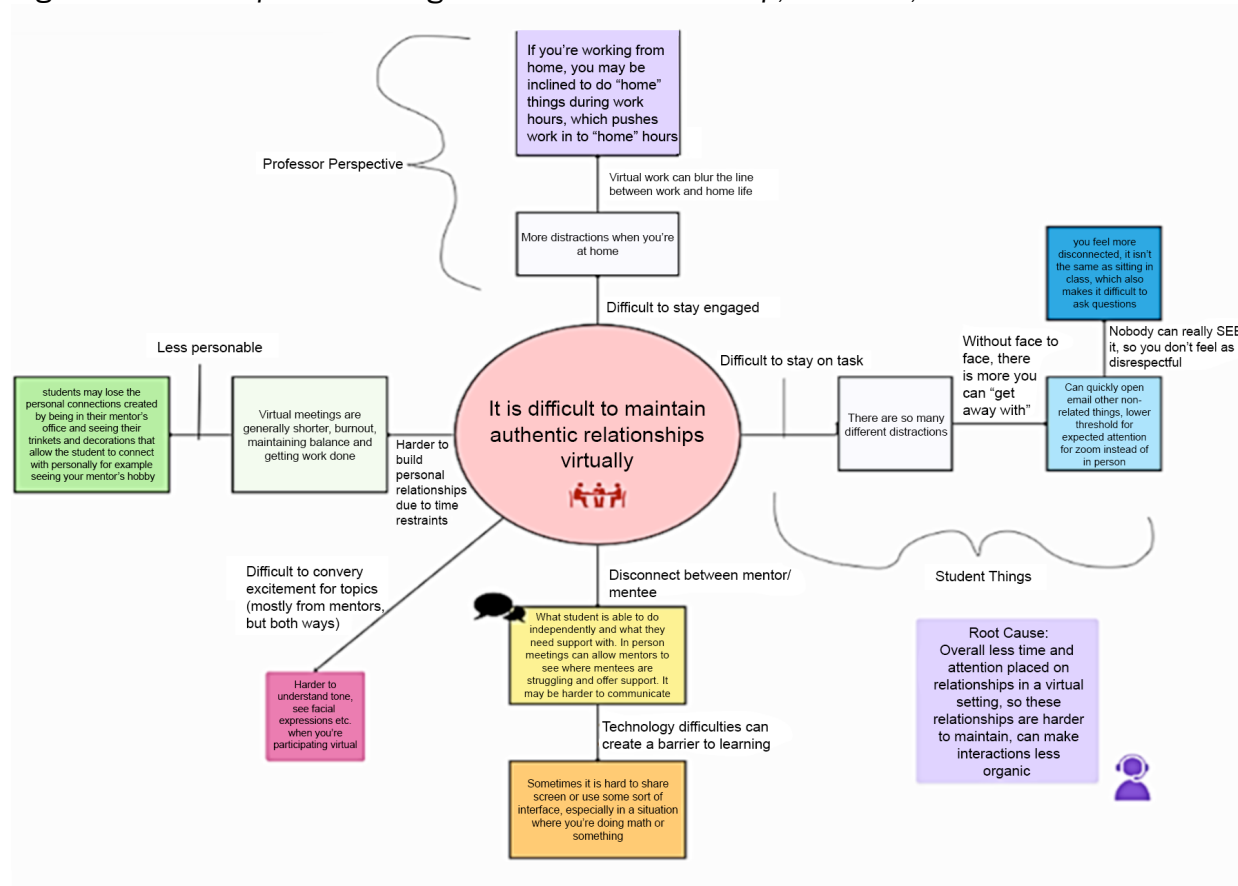
Discussion

The purpose of this paper was to describe the model and primary findings from a virtual mentoring workshop. There are several key takeaways from the VRMM workshop that can inform not only future planned workshops on virtual mentoring but also the larger academic community of students and faculty who engage in virtual research mentoring.

Despite the pandemic-imposed shift in academia to virtual platforms, only half or fewer of the student and faculty participants were currently engaged in mentoring activities via a virtual environment. In contrast to the low virtual mentoring participation, more than three-quarters/75% of the participants reported being somewhat or very comfortable with virtual research mentoring prior to participating in the workshop. It is possible that this low engagement in virtual mentoring represents a shift back to pre-pandemic, in-person mentoring environments, despite participants' self-reported comfort with virtual mentoring. If this is indeed the trend in higher education, it unfortunately represents a practice that excludes a large proportion of students who would otherwise benefit from meaningful mentoring experiences in a virtual environment (Collins et al., 2017). Also of interest is that we were unable to find any recent data on use of virtual platforms for research mentoring for comparison with the cohort in this study. Future work should include descriptive studies to quantify the use of virtual and in-person mentoring environments in higher education.

Two broader mentoring themes emerged from the workshop via the design team designs and post-event debriefing. These themes were focused on 1) students having a voice and a sense of belonging in the mentoring relationship, particularly for those students who are from

underrepresented communities in higher education, and 2) the importance of the mentor-mentee relationship beyond the scholarly intent of the partnership. These two themes will be further expanded upon below.

Having a Voice, Sense of Belonging, and Safety in the Context of Diversity

Mentees' perceptions of having a vested role and sense of belonging in the research experience can be particularly relevant to underserved and minoritized students. Underserved students challenged with financial need low rural resources, single-parent homes, English as a second language, and/or race-based discrimination often lack culturally sensitive and student-centered learning curricula (Toretsky et al., 2018). These factors can limit student focus, engagement, and participation, as well as sources of encouragement for academic excellence. Spillover effects include higher cases of depression, alcohol or drug abuse, and suicide (Walsh et al., 2021). Lack of participation due to feelings of exclusion can cause disengagement from learning activities, low involvement in extracurricular activities, an excessive number of absences, and an innate desire to be heard, which collectively result in lower quality conditions related to social determinants of health and academic achievement (Walsh et al., 2021).

College students, especially underrepresented students, can experience a high degree of lonelinessloneliness, which can lead to a lack of a sense of purpose and belonging. In addition to academic stressors, underrepresented students may experience discrimination and stereotype threats, which contribute to stress, disengagement, and burnout. Such challenges lead to disconnectedness from peers, mentors, and faculty (Wendel et al., 2021).

Strategies to attract and retain underrepresented individuals who aspire to pursue healthcare related careers, as an example, have focused on undergraduate interventions. According to McGee et al., these approaches have had limited success due to short-term or single-layered mentoring offerings and the pragmatic constraints of credit hour requirements for degree programs that take precedence over structured mentoring opportunities for underrepresented students (McGee et al., 2012).

Virtual mentoring provides a unique platform for fostering inclusivity and accessibility in research mentoring. Through virtual interactions, mentors and mentees can overcome geographical barriers and engage in meaningful connections regardless of their physical location. This enables physically disabled, non-traditional, and underrepresented students, including those from lower-income families, rural areas, single-parent homes, and non-English speaking backgrounds, to access mentorship opportunities that might otherwise be limited or unavailable to them. Thought of in a different light, virtual mentoring allows the student to remain in an emotionally and physically safe place, without the on-campus reminders of being underrepresented. There is also a natural buffer and distance that can provide an additional sense of comfort to students who may have a lesser sense of belonging in a traditional on-campus setting (Gopalan et al., 2022).

To foster a successful environment for underrepresented students and identify student-faculty needs, a beneficial mentoring program should 1) be multi-layered, e.g., include research skills mentoring and research efficacy coaching, 2) be persistent and develop a depth and breadth of opportunities throughout the undergraduate timeline, and 3) provide purposeful opportunities for menteesto observe and identify the real needs of their research population throughout the timeline (Kannel & McGee, 1986; Ng et al., 2020).

Mentor/Mentee Needs and Goals

Both student and faculty workshop participants expressed the importance of establishing a relationship that is based on mutual trust, the mentor's interest in the mentee's expectations and

goals for the mentoring experience, and developing deeper relationships with one another. This is consistent with work by Felten and Lambert (2020), which highlights the importance of "relationship-rich education." To this end, the team's designs were broadly focused on creating solutions to allow mentors and mentees to better understand *a priori* needs, goals, and expectations in a mentoring relationship. As presented in the results above, the teams approached these virtual mentoring challenges by creating designs that either assisted in bridging interpersonal knowledge gaps through intentional survey questions, or through training and resources.

Teams that focused on relationships designed prototypes, such as a pre-mentoring survey, to assist in better-matched mentoring teams and/or to allow for deeper understanding and appreciation of mentor/mentee goals, expectations, and personal interests. These approaches also emphasized retaking surveys regularly as goals, expectations, and personal interests change; doing so would allow for mentor/mentee relationships to grow and evolve over time.

Teams that emphasized mentoring tools and resources had designs that sought to provide applied, pragmatic solutions, such as virtual mentoring training and toolkits. It was also evident that a feeling of isolation from peers and colleagues could persist in virtual environments; thus, developing online communities of faculty and students who are engaged in virtual mentoring can aid not only in attenuating the feeling of isolation but also in providing a venue to share experiences, resources, and best practices in virtual mentoring. To this end, these designs also had an interpersonal component beyond the pedagogical focus. Developing and nurturing meaningful relationships between mentees and mentors was clearly a priority among all teams and is one of the salient practices of undergraduate research mentoring (Shanahan et al., 2015), and one that could be beneficial for mentoring with well-being of mentees in mind (Hall & Ketcham, 2022; Hall et al., 2023; Kannel & McGee, 1986; McGee et al., 2012; Ng et al., 2020; Toretsky et al., 2018; Walsh et al., 2021; Wendel et al., 2021)

Structures, Resources, and Partnerships to Support Virtual Research Mentoring

Institutional resources and support are important components to consider and to advocate for to maximize the impact of virtual mentoring. Higher education institutions have varying degrees of support and resources for virtual environments. One positive outcome from the COVID-19 pandemic was the scaling-up of these resources almost ubiquitously across the higher education landscape. It is recommended that mentors are knowledgeable about institutional remote learning platforms and resources, and that they advocate for access to technology and appropriate training when these resources are lacking (i.e. access to an instructional designer for development of online research curriculum and training). Other supportive institutional policies to consider and to advocate for are recognition of workload with virtual mentoring for promotion and tenure processes and allowance of core or elective course credit for mentored research activities through existing courses. Lastly, inter-institutional partnerships among mentees and mentors broaden the diversity and expertise in mentoring experiences available to participating faculty? and such partnerships should be sought out wherever practical and feasible. Inter-institutional partnerships could alleviate some of the perceived burden and pressure of faculty from underrepresented backgrounds to mentor students from similar backgrounds. Inter-institutional virtual mentoring communities can foster a team mentoring approach and provide a richness to the experience that one mentor alone cannot provide (Deanna et al., 2022).

Lessons Learned

Due to time limitations, we did not incorporate team building and idea-sharing activities into this extent that we would in a multi-day event. These activities would include structured time for each team member to collect their thoughts and share their ideas with teammates before and after each activity in the design process. Such time allows for active listening in a team setting and for helping

teams leverage the diverse perspectives of all team members. As we seek to make activities more inclusive, ensuring that the ideas of all team members are heard and valued is essential for innovation and the development of more meaningful solutions.

Next Steps

Since 2020, research mentorship has been challenged by the barriers imposed by the pandemic environment, limiting in-person interactions and traditional face-to-face mentoring settings. Furthermore, inclusivity and equity in accessing high-quality mentoring to promote student-driven research success remains tantamount to equitizing research mentoring models (Pierszalowski et al., 2018). The transformative experience of experiential learning through undergraduate research may benefit Historically Underrepresented Minority (HURM) students even more than the general student body (Finley & McNair, 2013). Virtual mentorship has emerged as a solution to both challenges and offers a high-impact alternative for crucial student research engagement. To maintain program fidelity and ensure primary data can be collected and successfully analyzed from future events, the CAA Academic Alliance has produced a VRMM Toolkit, disseminated in early 2024. The toolkit emphasizes perspectives from the mentor and mentee and the dynamic relationship between them. Relationship-building and other human development considerations (trust, respect, and empathy) as part of the larger context for successful mentoring, particularly in the virtual realm, are included. By leveraging virtual platforms, the VRMM program fosters connections between faculty mentors and underrepresented students, emphasizing cross-cultural communication skills and culturally based emotional intelligence. The toolkit offers specifics on VRMM event planning, tools and timelines to conduct future events, and overviews of the evidence-based curriculum resources used in the pilot. Through ongoing evaluation and refinement, the virtual mentoring toolkit can be optimized to provide a transformative experience for undergraduate mentors and mentees, promoting inclusivity and accessibility in research. The development of an engaging and inclusive virtual research mentoring toolkit represents a significant step towards addressing inclusivity and accessibility issues in undergraduate mentorship. A link to the VRMM toolkit can be found here (chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.caa-academics.org/wp-content/uploads/2024/01/VRMM_Final-Digital.pdf).

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