International Journal of Health Sciences Education
Manuscript 1130

Innovation in Health Science Education: An Experiential Learning Program

Lily Apedaile

Introduction

In the Spring of 2020 as shutdowns began across the United States, it became apparent that health professions education programs were not going to be immune to the impacts of the pandemic. Many healthcare facilities closed their doors to health profession students whether that was job shadowing or clinical training. By late March, most medical education programs had halted clerkships for medical students and moved all didactic training to an online format (Rose, 2020). Even after medical students were allowed back into healthcare facilities, many medical education programs had to shorten or reduce the number of clerkships they could offer their students. The students also experienced less than optimal patient interactions in most clerkships because many physicians were seeing fewer patients or only seeing patients via telehealth (Rose, 2020). Across the board, other health profession education programs from nursing to allied health saw similar barriers in educating the healthcare providers of tomorrow. While some programs were able to transition to remote or online platforms for clinical rotations, others invested in simulation training experiences to help simulate the patient-provider experience (Arandjelovic, et al., 2020, Rabe, et al., 2020).

Pre-health profession students were also impacted by the COVID-19 pandemic. Job shadowing sites were shut down to these students as well. However, most health profession programs require some sort of job shadowing experience as part of the application process, leaving many pre-health profession students in limbo about how to fulfill that requirement for their application. Several different virtual opportunities to job shadow and volunteer have been made available for students (Moon, 2020). As with telehealth for health profession students, this option was not quite the same as in-person clinical experiences While the issues with clinical placement and job shadowing sites in Montana have been mostly temporary, there are concerns about the long-term impact on healthcare workforce development. Montana is particularly affected by a healthcare workforce shortage where 52 of the 56 counties in the state are classified as medically underserved and as health professional shortage areas. Healthcare is the largest employment field in Montana. These jobs typically pay more than the average state wage/salary with a continuously strong demand for workers, but Montana cannot attract or retain these professionals. Healthcare professionals account for 22% of the high demand jobs in Montana, most of which are not filled each year. Fifteen counties in Montana do not have a primary care physician, ten counties do not have a practicing nurse practitioner, and seven counties do not have a practicing physician assistant (Juliar, 2017). Without consistent health profession job shadowing and/or clinical training sites due to COVID-19, health profession educators and workforce development coordinators in Montana were concerned that these healthcare shortages in the state would worsen.

Some of the staff and faculty in the University of Montana College of Health, UM Health & Medicine, and the Western Montana Area Health Education Center started brainstorming about safe ways to restore valuable healthcare experiences for both the pre-health profession and health profession students at the University of Montana. The pipeline of students entering the healthcare field was too important to be completely lost during the pandemic. A huge part of this pipeline is providing students with real-world experiences in healthcare so they can gain better insight into pursuing a career in this field or receiving clinical training experience. Sklar (2020) pointed out

while COVID-19 has been disruptive to health professions education, it has also opened health science educators' eyes to new possibilities in the health professions education field. Sklar (2020) also noted the importance of public health training and education in the health professions to help prevent future pandemics. In a similar vein, several educators at the University of Montana sought to provide healthcare educational experiences outside of the classroom that also were part of the COVID-19 response on the University of Montana campus. This led to the formation of the Griz Health experiential learning program.

Griz Health Formation

In early May 2020, a group of faculty and staff from the University of Montana's College of Health met to talk about how students could be involved in the COVID-19 response both on campus and in the nearby community. Faculty in the School of Public and Community Health Sciences had already established a partnership with the Montana Department of Health and Human Services to create an online, self-paced contact tracing course that could easily be adapted for college students. The Public Health faculty anticipated a significant need in on campus contact tracing given the dynamics of college students' daily interactions. The group also felt that using fellow students to help with contact tracing would help remove barriers to gaining an accurate picture of students' close contact encounters because there would be less perceived judgment when sharing this type of information with a peer versus a non-peer. Also, this was a means of providing a similar learning experience that pre-health profession and health profession students would receive during job shadowing or basic clinical training. Training a group of student contact tracers for on-campus response became the initial mission of Griz Health.

An online course was created using the learning management system Moodle; so, the online contact tracing material could be adapted and offered to UM students. The objectives of this course were to provide an overview of public health laws and authority, explain COVID-19 transmission and ways to investigate and control an outbreak, describe how to respond to an outbreak, and conduct surge contact tracing ("Montana Public Health Training Center", 2020). The course material was broken up into four one-hour video lectures that students watched via the Moodle platform. At the end of each lecture was a quiz that students had to complete and receive a 100% on before moving on to the next lecture. All contact tracing learning components had to be completed before engaging in COVID-19 response activities.

The Griz Health program was originally designed to train student contact tracers for on-campus contact tracing. Like most things during the pandemic, these plans changed quickly; so, we had to be flexible and respond. Due to restrictions from the local health department, the Griz Health students were not able to conduct any contact tracing. This required the Griz Health program to shift from contact tracing to providing generalized COVID-19 campus response that still met the overall mission of providing healthcare experiences for the pre-health profession and health profession students. To accommodate the many different schedules of our volunteers, we used a scheduling software. Different volunteer activities were posted each week onto the scheduling calendar and volunteers could choose which activities they wanted to help with. This also allowed the program coordinators to easily track how many hours each volunteer was completing every week and also provided the students with a verified log of healthcare experience hours.

The main types of volunteer activities the students participated in were COVID educational outreach, symptom screening, asymptomatic testing, and social media campaigns. A select group of Griz Health students were trained to help process SARS-CoV-2 nasal swabs in a testing facility on-campus (see Table 1). These students worked alongside Montana National Guard members and University of Montana scientists to learn how genomics was being used to diagnose COVID19 cases.

Table 1: Griz Health Healthcare Experience Activities

Griz Health COVID Response Activity	Learning Outcomes	Implementation
Contact Tracing Training	• Basic understanding of public health • Applying epidemiology measures to control disease outbreak • Basic understanding of HIPPA and Montana health privacy laws • Explain how population-based care influences the health of the individual patient	• Unable to conduct due to local restrictions
On-Campus Symptom Checking	• Engage in patient-centered care by interacting with students to assess COVID-19 symptoms • Perform vital signs on students • Collect anonymous patient data, analyze symptom data, and recommend evidence-based practices to reduce COVID-19 spread on campus • Work on an interprofessional team	• Students worked in pairs • Walked around on campus and interacted with students and staff • Asked if they could ask student/staff if they could screen them for COVID-19 symptoms • No PHI was collected during these screenings • If someone was displaying symptoms, they were referred to a healthcare provider for testing
Educational Outreach/Social Media Campaigns	• Design and implement educational strategies to mitigate COVID-19 on campus and improve campus health and wellness	• Students worked in small groups • Identified areas of misconception or lack

	• Communicate effectively, and with a limited bias to reach many different audiences	of understanding about COVID-19 Designed social media campaigns, informational games, etc. to interact with UM student population
COVID-19 Test Swab Sample Processing	• Collaborate and work on an interprofessional team • Manage health informatics to ensure the quality of patient information • Analyze health informatics data	• Students verified information on COVID-19 test swab tubes to manifest • Entered test tube patient information into a secure spreadsheet • Generate labels for qRT-PCR test tubes

While the Griz Health program was considered a volunteer program, we wanted to provide some incentives to the students that regularly participated since recognition is a key component to keeping volunteers engaged (Hager & Brundney, 2008). Students that completed 3-5 hours a week of volunteer activities received money loaded onto their campus account so that they could purchase food at one of the campus dining locations. Also, students that completed the contact tracing training, volunteered weekly, and participated in Griz Health for at least a semester received a digital badge that documented the knowledge and skills they mastered in the program. The program targeted pre-health profession and health profession students since the main goal of the program was to provide healthcare-related experiences for students that had lost shadowing or clinical opportunities. However, the program was designed to be interdisciplinary; so, students from any major or field were welcome to participate. To recruit students to participate in the Griz Health program, an informational flyer was made that described the Griz Health program which was then distributed to the pre-health profession and health profession advisors. This flyer was also posted on social media platforms to reach a broader University of Montana student audience.

Griz Health Pilot Project

It became apparent while working with the Griz Health students during Fall 2020 that they had great ideas about how to help the community and wanted ways to volunteer and be involved beyond COVID response. COVID response on campus started to slowly ramp down during the Spring 2021 semester. We wanted to continue to provide a way for students to get involved with the community and address healthcare issues.

Blackstone Launchpad is a program at the University of Montana focused on entrepreneurship and innovation. Typically, this program focuses on business and marketing programming, but Griz Health partnered with them to examine how business innovation practices could be applied

to tackle healthcare issues since many health profession programs include innovative thinking, critical thinking, and/or innovation as part of their learning standards ("Accreditation Standards and Key Elements for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree", 2016; "Physiotherapist education framework", 2021). We also wanted to include a public health focus since public health and/or population health has started to be incorporated into many health professions programs; so, we incorporated a focus on social determinants of health.

One type of experience that Blackstone Launchpad sponsors is a hackathon. Hackathons started as short-term events for computer programmers to collaborate on a specific tech-related problem (Lawrence, 2016). Since their creation, hackathons have been adapted to be used in many other areas outside of the tech field. The hackathon model provided a perfect framework to pilot a transition for Griz Health from COVID-19 campus response to a community engagement experiential learning program that uses innovative thinking to address social determinants of health and solve healthcare issues.

The innovation process typically is used in the business field to develop new products or processes and bring them to market. This process is made up of five steps 1. Idea Generation, 2. Advocacy and Screening, 3. Experimentation, 4. Commercialization and, 5. Diffusion and Implementation (Mariello, 2007). Many of these steps can be easily translated to the healthcare setting; however, we had to tweak certain aspects of this process to make it more applicable to tackling healthcare issues. For example, the goal of innovation in business is to bring an idea or product to market, but, in healthcare, the goal of innovation is to improve health outcomes through a new product or process. This means that step four, Commercialization, does not fit well within the healthcare framework; so, we changed this step to Stakeholder Buy-in. We then used these five steps during the hackathon.

A hackathon usually lasts for 24-48 hours. Since the healthcare issue we were interested in tackling for the Griz Health pilot was fairly complex, we decided to have the hackathon last for about 3 weeks. We partnered with a local healthcare startup company in Missoula, MT called Montana Pediatrics. One of the projects that Montana Pediatrics is working to develop is innovation in telemedicine. Montana Pediatrics is working with the Fort Peck Tribes to offer pediatric care via a telehealth network of pediatricians and specialists. The work that Montana Pediatrics has been doing with the Fort Peck Tribes aligned well with the mission and goals of Griz Health: to use the innovative process to solve complex healthcare issues in Montana, especially for underserved populations.

We met with representatives from Montana Pediatrics to get a better sense of a complex issue the Griz Health students could work on that related to their Fort Peck Tribes collaboration. We settled upon having the students help address access to care and retention of providers. Once we had a complex issue for the students to address, we began recruiting both undergraduate and graduate students. We wanted to keep Griz Health an interprofessional educational experience; so, students from all majors were encouraged to participate. Since this was a pilot project, we limited the size of the hackathon to a max of 10 students. Then we recruited four judges to assess the students' innovative solution pitches, 2 on-campus judges and 2 judges from the healthcare

industry, and four mentors to help guide the students while they developed their pitches. Seven students registered and completed the hackathon: 3 pre-medical undergraduate/post-bac students, 1 pharmacy student, 1 psychology student, 1 speech-language pathology student, and 1 business student. The hackathon was started using a virtual kick-off event that lasted about 2 hours.

During the kick-off event, the representatives from Montana Pediatrics spoke about how they used the innovation process to start Montana Pediatrics and form a collaboration with the Fort Peck Tribes to provide background information and help motivate the participants. They also spoke about the main obstacles they were encountering to implement telehealth in school settings on the Fort Peck Reservation. The two main issues we focused on for this hackathon were that many residents on the Fort Peck Reservation had trouble accessing basic healthcare (i.e. doctor's visits, prescription pick-up, telehealth visits, etc.) due to the rural nature of the reservation and that there was a high turnover rate for CNAs that were trained on how to set up and start telehealth visits that Montana Pediatrics hosted. At this point, we had the students engage in the first step of the innovation process, Idea Generation. This was done by facilitating discussion with the students about potential problems within the two overarching issues they could tackle for their pitch. Next students moved on to the second step of the innovation process, Advocacy and Screening, by ranking the problems based on their interest level. We used these rankings to break the students into two small groups. To wrap up the kick-off event, the groups started on the third step, Experimentation, by going into breakout rooms to meet with their two mentors and to get started on developing their innovative solution pitch.

The student groups then had about two weeks to work through step 3 of the innovation process with each other and their mentors During this step the students had to identify the social determinants of health that were involved in the healthcare issue and think about how their solution would address these social determinants of health. By the end of this step, each group had to design an innovative solution pitch to deliver to a panel of judges. The students were provided with the rubric that the judges would use to assess their pitches and some overall guidance on how to make a good, concise pitch. After the two weeks the students, mentors, and judges gathered to go through the Stakeholder Buy-in step, and each team was given about 10 minutes to go over their proposal (see Table 2). Then the judges met and discussed each proposal, completed the proposal assessment rubric, and decided on a winner. Once the winner was chosen, the entire group reconvened. The judges went through the rubrics and provided feedback to each team both on positive aspects of their proposals and areas they could improve before moving on to step five of the innovation process. The winning team received a cash prize and $1,000 to implement their plan. Montana Pediatrics offered internships to both teams to implement their projects so that students could engage in the last step of the innovative process, Diffusion and Implementation.

Table 2: Innovative Solution Proposals

Team	Proposed Innovative Solution	Social Determinants of Health Addressed
Team 1 (Winner)	1. Create a focus group of current and former CNAs to better understand the	Education Access Healthcare Access
	challenges of their job. 2. Provide focus group feedback to local CNA employers so they can implement change in their facilities. 3. Work with local high school(s) to establish CNA training program to establish a workforce pipeline.	
Team 2	1. Establish prescription pick-up sites at various locations on the Fort Peck Reservation. 2. Have a pharmacist from the Indian Health Services deliver prescriptions to these locations at specified times during the week.	Healthcare Access Built Environment

To evaluate the pilot project, we surveyed students, mentors, and judges that participated in the hackathon and received positive feedback about the pilot project. Based on this feedback, we decided to proceed with developing experiential learning courses for Griz Health that would expand on the pilot project framework.

"I am really impressed by this program. I didn't really know what to expect, but I just love how it brings people together to brainstorm solutions to real problems. This type of thing needs to happen more!!" **~ Student participant Griz Health Courses**

We decided to split up the innovation process into a year-long course to instruct students on implementing the five-step innovation process in healthcare. The first semester would be steps 1-3 and focus on learning about social determinants of health, the innovation process in healthcare, and developing and delivering a proposal. The second semester would be steps 4-5 and mainly focus on the implementation of the finalized proposal with a local healthcare entity such as partnering with the local senior citizen center to increase participation in health and wellness classes. These courses will be interdisciplinary and will be open to upper-level undergraduates and graduates. Both courses have the following learning objectives in addition to applying the innovation process to healthcare:

- Cultural Competency: Students will learn about cultural competency and how to apply the innovative process to healthcare issues while being sensitive to the cultures and/or communities they are working with.
- Gathering/Meeting Effectiveness: The students will be working in small groups of 3-4 to design and implement an innovative solution so they need to know how to work effectively together, especially how to have meetings productively. We also want to make sure that the student groups are working effectively so that our community partners' time is not wasted when meeting with the students.
- Team-Work Dynamics: Group work is notorious for being frustrating and difficult. Students will identify their strengths and weakness. The groups will utilize this information to establish roles for each group member based on their strengths to help avoid the common group work pitfalls.
- Working with Constraints: Part of the innovative process involves working within constraints to help drive the creative process. Each team will be given a budget to work with when designing their proposals and this will be the amount the groups can use to implement their proposals during the second semester.
- Presentation Skills: All group members will be expected to present part of their proposal to the judges' panel in the first-semester course. The students will practice the art of public speaking so that their presentation is clear and concise for the judges and community partners.

Conclusion

While the pandemic presented many challenges for healthcare workers and health profession educators, it also highlighted the importance of innovation. At the University of Montana, the pandemic brought together a diverse group of health science educators to tackle two issues: the need for real-world healthcare experiences for students and COVID response. To tackle these two issues, we formed an experiential learning program called Griz Health. This program highlighted the amazing energy and talent of students at the University of Montana and their desire to give back to the community. Like the COVID-19 pandemic, this program was ever evolving in response to the needs of both the campus community and the Missoula community. There was such a positive response to the Griz Health program that we adapted the program into a yearlong course for students to engage in interdisciplinary, community service projects centered around social determinants of health.

References

Accreditation Standards and Key Elements for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree. ACPE. (2015). https://www.acpe-accredit.org/pdf/Standards2016FINAL.pdf.

Arandjelovic, A., Arandjelovic, K., Dwyer, K., & Shaw, C. (2020). COVID-19: Considerations for Medical Education during a Pandemic. MedEdPublish, 9(1). 87. https://doi.org/10.15694/mep.2020.000087.1

Juliar, K. (2017). Montana healthcare workforce statewide strategic plan [Ebook]. Retrieved from http:// healthinfo.montana.edu/Strategic%20Plan%202017.pdf

Hager, M.A., & Brudney, J.L. (2008). Management capacity and retention of volunteers. *Challenges in volunteer management*, 9-27.

Lawrence, A. (2016). *What is a Hackathon? A Newbie's Guide to Collaborative Coding*. Rasmussen.edu. https://www.rasmussen.edu/degrees/technology/blog/what-is-a-hackathon/.

Mariello, A. (2007). *The Five Stages of Successful Innovation*. MIT Sloan Management Review. https://sloanreview.mit.edu/article/the-five-stages-of-successful-innovation/.

Montana Public Health Training Center. UM School of Public and Community Health Sciences. (2020). https://health.umt.edu/mphtc/trainings/contact-tracing.php.

Moon, K. (2020). Online opportunities for premed students during Covid-19. Forbes. https://www.forbes.com/sites/kristenmoon/2020/07/21/online-opportunities-for-premed-students-during-covid-19/?sh=68277d976d91.

Physiotherapist education framework. World Physiotherapy (2021). https://world.physio/sites/default/files/2021-07/Physiotherapist-education-framework-FINAL.pdf.

Rabe, A., Sy, M., Cheung, W.Y.W., & Lucero-Prisno, D.E. (2020). COVID-19 and health professions education: a 360° view of the impact of a global health emergency. *MedEdPublish*, *9*(1).

Rose, S. (2020). Medical student education in the time of COVID-19. *JAMA*, *323*(21), 2131. https://doi.org/10.1001/jama.2020.5227

Sklar, D. (2020). COVID-19: Lessons from the disaster that can improve health professions education. *Academic Medicine*, *95*(11), 1631-1633. https://doi.org/10.1097/acm.0000000000003547