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ORIGINAL RESEARCH

Perceptions of Undergraduates and Mentors on the Appropriateness, Acceptability, and Feasibility of the HEPI-TUITAH Micro-Research Approach to HIV Training in Uganda

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Purpose: To evaluate the perceptions of undergraduates and mentors on the appropriateness, acceptability, and feasibility of a mentored seed-grant (micro-research) by Health Professions Education Partnership Initiative - Transforming Ugandan Institutions Training Against HIV/AIDS (HEPI-TUITAH) program on HIV training in Uganda.

Methods: We conducted a cross-sectional descriptive qualitative study with focus groups, on HIV micro-research training, with undergraduate health professions students and faculty mentors across three partner institutions in rural Uganda.

Results: A total of 24 students and 13 mentors (5–8 per group) took part in the focus group discussions. Most participants stated that the HEPI-TUITAH micro-research program was acceptable, appropriate and feasible for health professions undergraduate students. The interprofessional education approach of bringing together students from different programs and years of study was valuable especially for peer mentorship. There was a need to provide for institution-based training in addition to the centrally organized training for the benefit of all the team members. Participants also noted a need for the program to find a way of providing the students with data collection experience even with the COVID-19 pandemic situation.

Conclusion: The HEPI-TUITAH micro-research program was perceived as acceptable, appropriate, and feasible for health professions undergraduate students. It also promoted teamwork and academic collaboration. Provision for institution-based micro-research training activities and data collection experiences for the undergraduate students even during the COVID-19 pandemic would make the program more valuable. The lessons learnt will be applied to future training cohorts to optimize program impact and may be useful for similar programs in other settings.

Keywords: HIV research training, mentored research, interprofessional education

Introduction

Building research capacity is fundamental to improving health outcomes in resource-limited countries.[1] Training of health professionals in Uganda has traditionally focused on clinical skills with less emphasis on research. In practice, health professionals are expected to engage in research as collaborators, drivers, or partners but have limited or non-existent resources and training. Empowering undergraduate students with research skills, and providing mentorship in higher institutions of learning is a good strategy for introducing a research culture among undergraduate students.[2,3] Introducing research skills early in training increases interest and later career engagement in research.[4]

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To that effect, Mbarara University of Science and Technology (MUST) received a five-year grant (R25TW011210) from the Fogarty International Center of the United States National Institutes of Health to support the HEPI-TUITAH (Health Professions Education Partnership Initiative - Transforming Ugandan Institutions Training Against HIV/AIDS) program. This program has three primary objectives: (1) increase the competency of undergraduate health professions students in the management of HIV; (2) enhance the capacity of primary health care providers to provide comprehensive HIV services; and (3) develop the capacity of undergraduate health professions students to conduct locally relevant research in HIV. HEPI-TUITAH consists of training and mentoring activities at MUST and her partner institutions (Bishop Stuart University – BSU and Lira University – LU in Uganda) in collaboration with Massachusetts General Hospital – MGH in the US.

Undergraduate students trained using an interprofessional education approach are more likely to become collaborative health professionals.[5] In HEPI-TUITAH, we embraced a inter-professional approach, training the students as members of an interdisciplinary team,[6–8] guided by the micro-research model.[9] Although the students' academic environments are different, practice environments are increasingly requiring inter-professionalism, thus requiring collaboration to draw upon each profession's strengths.[7] We integrated capacity-building for HIV/AIDS research into the training so that if they choose to stay and work (clinically or in research) in the rural setting, they have the requisite expertise and skills. Prior research suggests that students who train at rural institutions are more likely to stay and work in rural settings than those from urban settings.[10,11]

In its third year of implementation, we set out to evaluate the perceptions of undergraduate health professions students and mentors on the appropriateness, acceptability, and feasibility of the HEPI-TUITAH micro-research approach to HIV training in Uganda. Implementation outcomes (acceptability, appropriateness, and feasibility) serve not only as indicators of the effects of implementation processes but also as preconditions for obtaining the desired results.[12] These outcomes are essential for monitoring and evaluating the success of implementation efforts and comparing the effectiveness of alternative implementation strategies.[13] As program leadership, we planned to evaluate implementation of the HEPI-TUITAH at two time points (ie, mid-term in Year 3, and end line Year 5) to compare the results and determine the success of the program.

Methods

Research Design Overview

This was a cross-sectional descriptive qualitative study that used focus groups with faculty mentors and undergraduate health professions students to evaluate the acceptability, appropriateness, and feasibility of the HEPI-TUITAH micro-research program as well as explore facilitators and barriers to program implementation. Focus groups were used to promote synergy among the participants, allowing exploration of collective memories, experiences, positions, practices, and desires.[14]

HEPI-TUITAH Program Description

We provided competitive seed-funding opportunities to health professions undergraduate student at MUST and BSU in Mbarara District and LU in Lira District. Priority research areas included: a) utilization of HIV/AIDS services in the community, b) linkage between health facilities and the community, c) social and community factors affecting antiretroviral therapy adherence and retention in care, and d) HIV-related stigma and discrimination.[15] Multidisciplinary research team formation was encouraged within the participating academic institutions with representation from at least two health professions programs. Teams comprised of 4–6 health profession students and at least one faculty mentor. We proposed (in Years 2–4 of the HEPI-TUITAH program) to award 72 micro-research grants of up to $2000 USD each to health professions student research teams to conduct 12-month mentored research projects and publish/disseminate their findings. The HEPI-TUITAH program has so far provided micro-research awards to 44 teams (24 in Year 2019/20 and 20 in Year 2020/21). For each cohort of micro-research faculty mentors, the Uganda faculty took part in quarterly mentor-training sessions delivered by counterparts at MGH. The goal of the mentor-training sessions was to share best practices

on how to successfully support undergraduate health professions student teams to conduct micro-research and publish their findings.

HEPI-TUITAH Micro-Research Approach

We used the micro-research model[9] in which student research teams were taken through a scientifically rigorous process of concept development before micro-grants were awarded. MUST began to use the micro-research model in 2008 with a previous program, awarding junior faculty research teams micro-grants of $1500 - $2000 USD to conduct small interdisciplinary research projects.[16] We adapted the micro-research curriculum to the training needs of undergraduate students. It included the use of a multi-step process for selecting micro-research grant recipient teams from MUST, BSU and LU:

Step 1: Request for micro-research grant topics. An advertisement was shared for distribution to the students.

Step 2: Screening of applications by the program implementation committee (PIC). Criteria included multi-disciplinary team formation and relevance of research ideas to TUITAH HIV/AIDS priority areas.

Step 3: Training student teams in developing research concepts. In a 5-day training, research teams participated in hands-on concept development including formulation of research questions and objectives and selection of a design and methodology. The research teams then pitched their concepts for selection.

Step 4: Matching research teams to mentors. Successful research teams were matched to mentors at the home institutions (ie, MUST, LU, and BSU) to support full proposal development and implementation.

Step 5: Orienting mentors to the micro-research model. Mentors were trained on the micro-research model and their expectations of models as mentors, including supporting students in managing a research team, developing and managing a budget, balancing being a researcher and a student, and maintaining motivation.

Step 6: Research proposal development. Research teams and mentors underwent another 5-day hands-on training to develop full proposals and obtain ethics approval.

Step 7: Providing micro-grants for research implementation. Funding was released to the research teams through the respective institutions. Data collection took place over two months.

Step 8: Data analysis and manuscript writing. After data collection, the research teams took part in a final 5-day training on data analysis and manuscript writing.

Step 9: Dissemination of findings. All the mentored research projects disseminated their results in in peer-reviewed journals and a dissemination conference.

Focus Group Discussion (FGD) Participants

Participants were undergraduate health professions students and faculty mentors at MUST, BSU and LU whose research teams were successfully selected for funding in years 2019/2020 and 2020/2021. The micro-research team leaders and mentors were invited through different platforms (WhatsApp and telephone) to participate in the evaluation.

We held FGDs separately for students and mentors, enrolling a convenience sample of the first students and mentors to volunteer. Discussions were held in person (compliant with the social distancing guidelines at the time), grouping participants from MUST and BSU together based on co-location in Mbarara District; discussions involving LU were held separately.

Differences in the Implementation Process

The initial implementation strategy prior to the COVID-19 pandemic was to engage student teams face-to-face in all aspects of the training activities, and they were supposed to go to the communities for data collection. With the onset of the pandemic, we adjusted the implementation strategy to a hybrid of asynchronous (use of pre-recorded materials) and synchronous (in-person for only team leaders and mentors) training in proposal development, data analysis, and manuscript writing. The first cohort (2019/2020) of micro-research student teams were able to collect their data because the universities were not in session; however, with the second cohort (2020/2021), that was not possible because universities had reopened for the students to catch up on lost time; research assistants were engaged to collect data for the students.

In terms of assigning mentors to the micro-research student teams, in the first cohort, the mentors and student teams were paired based on the availability of the mentors. With the second cohort of students, there were thematic research areas around which the student teams developed concepts and presented to the mentors before mentor-mentee pairing was done. The mentors had an opportunity to select teams based on their areas of interest.

Data Collection

Data was collected using semi-structured questions guided by the micro-research program aims, after piloting them for clarity. We asked open ended questions with probes for further clarification[17] on the acceptability (eg, team formation, mentor matching), appropriateness (eg, fitness for undergraduate students), and feasibility (eg, level of mentor commitment) of the micro-research program. See Supplementary Materials file for the full interview guides. Face and content validity of the questions were assessed by JH (implementation scientist), ZMT (medical education specialist), and CO (principal investigator).

After seeking written consent, EKW, VA, FN and CA led five FGDs, three with the micro-research student team leaders (two in Mbarara and one in Lira), and two FGDs with the mentors (one each in Mbarara and Lira). The research assistants (VA, FN and CA) were all trained prior to data collection. All the FGDs were conducted in private where the participants could freely express themselves. The discussions were audio recorded and field notes were noted immediately afterward.

Analysis

All audio recordings were transcribed verbatim and anonymized prior to analysis. Once complete, EKW, CKK, and GZR read through while listening to the recordings, inserting notations for pauses, laughter, and punctuations. Thematic content analysis was conducted by EKW and CA. Transcripts were independently coded by EKW and CA using implementation outcomes (appropriateness, acceptability and feasibility) as the a priori themes, and disagreements in coding were resolved at each step. The process involved identification of similarities and differences through the participants' narratives. Coding was done manually, grouping similar quotes together under broad themes while eliminating duplicates, and ensuring inclusion of data from different sources. CO provided oversight of the coding quality.[13]

Ethical Considerations

Ethical approval was obtained from the Gulu University Research Ethics Committee (GUREC-2021-58) and permission to conduct the study provided by the Uganda National Council for Science and Technology (HS1351ES). Gulu University Research Ethics Committee is one of the many accredited IRBs under the Uganda National Science and Technology. The HEPI-TUITAH program is implemented in both southwestern and northern Uganda (ie, Mbarara University and Lira University respectively), all the research protocols for our undergraduate students at Lira University are reviewed by Gulu University Research Ethics Committee (there is no accredited REC at Lira University). We thus found Gulu University Research Ethics Committee relevant to review this research proposal. All participants provided written informed consent to take part in the study - The informed consent included anonymization of responses in the resulting publication.

Results

Of the 24 students and 16 mentors invited to participate in the FGDs, all students and 13 mentors took part; three mentors declined due to other engagements. The FGDs had 5–8 participants per group, and the discussions took place between March and April 2021, each lasting between 60 to 90 minutes. We present results from the FGDs in the form of a summary of the participant (mentors and students) responses to specific questions. Quotes from MUST and BSU have been labeled as *Mentors, Mbarara and Student, Mbarara* while those of at LU as *Mentors, Lira and Student, Lira*.

Theme 1: Acceptability of the HEPI-TUITAH Micro-Research Program

In this theme, we present participants perceptions on team formation, assigning of mentors, research capacity training, data collection, and pre-dissemination conference training.

Opinions About the HEPI-TUITAH Micro-Research Process

Team Formation

The students who participated in the micro-research activities encountered challenges of communication with the participants, because of poor team formation. Some teams did not consider the contexts for data collection to include local language speakers; instead, they looked for their colleagues with whom they spoke the same language:

> The experience I have from group formation …. We were told to get team members from different health professions programs … We got people we knew because we spoke the same language … my group had no local language speaker. … that was the bad experience I got from group formation and had to learn the hard way. (Health profession undergraduate student, Lira)

Assigning of Mentors

The mentors appreciated the thematic approach used when pairing them to the student teams stating that it allowed them flexibility to choose their areas of interest. This was in comparison to the approach used with the first cohort where the mentors and student teams were paired regardless of mentors' interests. Below are some quotes:

> One thing that I really liked was the fact that there were themes and each topic had to fall under some theme, … that helped the mentors to align their interest based on the theme. I found that very helpful with cohort two something that I felt we did not do in Cohort one. (Mentor, Lira)

> In the first cohort, we were appointed to different teams, we didn't even know the topics … when I compare to the second cohort, the team leaders presented their concepts to the mentors who were there, and we were told to choose the area we were comfortable with to work with the student teams. … that approach was the best. (Mentor, Mbarara)

Regarding mentors' interests, most of the students appreciated the time that the mentors dedicated to them, however, some expressed frustration about competing priorities as illustrated in the quote below:

> If a mentor is busy, it is better they tell you openly "I am busy I might not make it to meet up with you" or "maybe I can't meet up with you, please send an email and I am going to respond to it later" …. Instead of giving you false hope … It was really demotivating; you feel like maybe he/she is not really interested in what we are doing … but I believe if they communicated what is of help … it is much better than giving you false hope. (Health profession undergraduate student, Mbarara)

Research Capacity Trainings

We employed synchronous training for only team leaders, due to the COVID-19 restriction that limited large groups, as a creative solution for the continuity of program activities during the pandemic. However, the team leaders felt overwhelmed without the support of team members. They took in a lot of information with no opportunity of comparing notes with the team members in case one understood a concept differently.

> During proposal development, we had very limited time and most of us were first-time researchers … I remember the training was for five days and we used to have it in the evenings after classes, so the work was a lot in a short time. (Health profession undergraduate student, Lira)

> The approach to training in the second cohort was very innovative and far much better than the first cohort; however, only one student out of five was trained because of COVID … It is understandable but it was too much information for one student to take in for the first time. These are students we met on Monday and started working with them expecting that at the end of the week we had a draft proposal … it was overwhelming. (Mentor, Mbarara)

The students reported data analysis training as difficult but found the support of the trainers very helpful. They were excited about having a manuscript with their names as first authors.

> What interested me so much was the part of data analysis although it was one of the hardest parts … It was really a very good experience having professors training us on how to analyze those data both the qualitative and quantitative. … We really learnt a lot from them. (Health profession undergraduate student, Lira)

> I have always looked at research as something I love, so what motivated me was publishing a paper … At the end of it all, I wanted to have a paper with my name attached to it and I was looking at the opportunities that are coming with me publishing a paper. (Health profession undergraduate student, Mbarara)

Data Collection Process

Most participants did not find the data collection process with the first cohort of students acceptable, because not all of them got the opportunity to go to the field for data collection process. However, those who took part in data collection learnt a lot.

> We were all involved in proposal development so everyone got the knowledge … But when it came to data collection, we were told that only three people were supposed to go to the field because of COVID. We know that COVID was a major challenge, but we had expected that everyone would go and learn how to ask questions and get exposure on how to approach participants. (Health profession undergraduate student, Mbarara)

> Being a first timer in carrying out a qualitative research, it was a very good experience interviewing people and interacting with them … The process of data collection was so interesting, my team members missed. (Health profession undergraduate student, Lira)

Although demotivated by this approach, the students understood that it was the right approach in such unprecedented times.

> We were supposed to go for data collection, and we really needed that experience, but it just turned out that we were not going … but I understood because it was not feasible as we were also supposed to be having our lectures. … The issue of research assistants, they were helping us as we were catching up with our lectures. Really, I just appreciate the services the program is giving us. (Health profession undergraduate student, Lira)

> It was very demotivating, after spending sleepless nights working on the proposal and they say "you are not going to do data collection", that they had to get research assistants … The training in responsible conduct of research was the best for us who were supposed to do data collection … It was unfortunate we didn't go … but I think if they could get for us a chance, but COVID may still be around … Let students go and do data collection for purposes of learning. (Health profession undergraduate student, Mbarara)

In response to COVID related restrictions on students going for data collection, some mentors innovatively engaged the micro-research team leaders in the data collection process as exemplified below:

> I have always tried to drive around with my team leader provided he was free; I took him to the field and showed him how to supervise data collection if he is not the one doing it. … "do this, and if there is a mistake correct it, and replace this with this". I think that the team leader learnt a lot from the sessions that we have had together doing the supervision. (Mentor, Lira)

Pre-Dissemination Conference Training

All participants found the training timely and beneficial to the students who disseminated their research findings in October 2020. Their confidence had been built and they put up impressive presentations during the conference.

> The training was very important because it helped us build our confidence, … They made us present to the people who were around so during the process we became more confident and more familiar with the content we had and improved our slides and presentations skills. (Health profession undergraduate student, Lira)

> The pre-dissemination training was quite short, just one day but it was a productive day. We worked under pressure, but I would commend it so much because it gave us confidence; it was a real drill because you would do something, and they real show you that this is not something that goes outside this room. You cannot say it anywhere outside the door; so, you would also feel that you must do something that can be presented properly. (Health profession undergraduate student, Mbarara)

> You can imagine people presenting for the first time … Going through the presentations over and over helped them to acquire presentation skills and understand their document better. Majority were not familiar with their work, but as they went through over and over, they mastered it and the presentations were better. (Mentor, Lira)

Theme 2: Appropriateness of the HEPI-TUITAH Micro-Research Program

In this theme, we summarize participants perceptions on the appropriateness of the inter-professional education approach used, fitness of the micro-research program for undergraduate students, organization and presentation of the learning materials, and the mentor session provided by our international partners (MGH).

Inter-Professional Education Approach

Both students and mentors found the approach very useful in harnessing their different views because they all contributed to the development of strong research proposals.

> We had multidisciplinary professions from the midwifery, psychology, and public health. These all brought different input … Everyone had something to contribute to the research … So, I think that approach is an excellent one. (Health profession undergraduate student, Lira)

> The students were able to appreciate and learn from each other because they had different roles … It is a very good approach, combining different classes and age groups … You realize that each of them is very important, and each has a role to play. (Mentor, Mbarara)

However, bringing the inter-professional teams together was challenging given that the different programs and years of study had different schedules. The team leaders reported shouldering the bulk of the work. They also noted there were hardly any opportunities when all the members were available at the same time.

> We had different timetables … You find people are coming from Pharmacy, Nursing, etc. and you have different schedules, so finding time to come together and look through these issues was sometimes difficult … I had to go it alone most of the time. (Health profession undergraduate student, Mbarara)

Fitness of Program for Undergraduate Students

The participants found the mentored research program useful in introducing undergraduate students to research. They felt better placed in terms of research capacities including funds management than their colleagues who did not attend the training. Most participants believed that the HEPI-TUITAH training model of introducing undergraduate students to research was good.

> When you go through the HEPI-TUITAH trainings, at least you have some knowledge that anyone else around wouldn't be having and you are at least at some higher level than the rest of the students who did not attend. The trainings were good because the knowledge gained is used … (Health profession undergraduate student, Lira)

> Giving students some money to facilitate the research process helps to enhance the quality of the work they are doing. … This model is very good in helping to introduce the undergraduate students to research and how to go about managing the entire process including the funds that come along with the research. (Mentor, Lira)

Organization and Presentation of the Learning Materials

Some mentors were glad that there was an arrangement in place to benefit the intended learners; however, they were doubtful about the utilization of the learning materials by the students who did not attend the in-person classes.

> It was good having varied ways of trying to bring those ones who do not attend in-person to learn … although it is very challenging to have students listen all through the presentation. We struggle with them in online learning … my feeling is that a good number of them may not actually listen to the recording, and they miss out and yet being part of the team, they should benefit. (Mentor, Lira)

Mentors stated that it was their responsibility to support the students team members to learn when they could not attend the in-person trainings. They stressed the importance of the team leaders in the meetings with the team members who did not gain the opportunity:

> I think it's up to the mentors, if you get an opportunity, it's good to just have a few days in a week with the team members and the leader who attended the training to go through the learning materials and have a discussion through … Sometimes students just need to be reminded that they have a resource which they need to utilize. (Mentor, Lira)

Mentor Sessions by International Partners

All the Ugandan mentors found the mentor training sessions by faculty at MGH beneficial and felt the skills gained were useful for professional development beyond the HEPI-TUITAH activities. They acknowledged that mentoring was not straightforward and that they were open to learning.

> They are beneficial … They provide good information that is helpful in professional development and can be used outside HEPI … They provide reference material that is helpful when working with our research teams. (Mentor, Mbarara)

> Those sessions have been useful … mentoring is not obvious. There are things that we could have missed which we have been able to correct with the training sessions. I can rightly say that it's not only the students that have learnt; mentors have also learnt a lot from the international mentors, and we hope to learn more if we could continue with those sessions. (Mentor, Lira)

Mentors noted that they had learnt a lot but needed more skills in conflict resolution and management between mentors and students. They thought that conflicts arise because of different personalities in the team and were thus interested in learning more about the different personality traits and how they can be handled.

> There is need for a session on the different personalities of people within the group, and how to handle one another. Many people don't know how to deal with those differences. (Mentor, Lira)

Theme 3: Feasibility of the HEPI-TUITAH Micro-Research Program

In this theme, we present the perceptions of the participants on the level of involvement, and the commitment of the mentors, the mentoring program as well as the knowledge and skills gained by the students.

Level of Mentor Involvement

Once the cohort one research teams had been paired with mentors and expectations clarified, the program leadership trusted that the processes would flow as planned. However, there were communication gaps between the program, mentors, and student teams; roles and expectations of either party were not clearly understood, and mentor involvement was sometime minimal. With the streamlined communication in cohort two, timelines were clarified, and deliverables set. The second approach was appreciated because it addressed the gaps faced with the first cohort.

> I have been in both cohorts one and two and believe me in cohort one I almost felt that I was not part of the mentoring process … There was a big gap between the students and myself. … I would feel like the students were reserving something … When I would ask, they did not want to say anything about it … It was tricky, so I pulled back to see how far we would go. But in cohort two it has been very involving. The mentors have been fully engaged because of the modifications made by the program leadership. (Mentor, Lira)

Commitment of Mentors

Whereas the mentors found the level of commitment very demanding (eg, overseeing manuscript writing), most of them were motivated by the opportunity to publish a manuscript.

> Sitting for one-week training from morning until late at night was challenging especially given our age [participants laugh] and other work demands. … You know … You must support them [students] to do everything, that was too much commitment required … although rewarding at the end when the work is published. (Mentor, Mbarara)

Knowledge and Skills Gained

Regarding knowledge and skill acquisition, participants stated that the micro-research program positively empowered undergraduate students. They noted being able to write academic proposals for their work and believed that they would be able to publish their research. Here below is what they stated:

> I found it very simple to develop the proposal for my academic research because of the skills I gained … It was also very easy for me to figure out what segment of my academic research would require funding and what amount of funds I can use. (Health profession undergraduate student, Lira)

> I learnt how to develop a proposal in two days, well cited, and ready for presentation and I can defend it; I can go and collect any type of data, whether qualitative or quantitative. I can analyze data in the shortest time possible, and I can write a manuscript … I will be able to publish my undergraduate research. (Health profession undergraduate student, Mbarara)

Suggestions for Improvement

The key recommendation from the mentors was for the HEPI-TUITAH program to consider supporting institutional pre-training sessions before the centrally arranged training which brings together all team leaders and mentors. This suggestion was made in bid to prepare the students to better understand their work before the 5-day intensive training on proposal development, data analysis, and manuscript writing. This approach would give mentors and student teams ample time to familiarize with their work, as well as benefit the other team members who do not attend the in-person training due to COVID-19 restrictions.

> There needs to be preparatory workshops institutionally which are mentor led so that students galvanize the knowledge before the actual 5-days intensive training. … Since every institution has their own dynamics, they could be given the autonomy to make their own arrangements … but should be given a timeline within which to actualize the training and provide a report before the date can be fixed for a formal training. (Mentor, Lira)

> If we have for example a training on proposal development, we organize something in house then we have this with the students go through the basics and make sure the students are prepared for the main training. Usually what happens when we go through the one-week training, the mentor does all the work because the student is basically lost … We could have those sessions for one or two days within our institutions. (Mentor, Mbarara)

The students' suggestions for improvement included formalized peer to peer mentorship of the student research teams from the previous cohort members, inclusion of all team members in the training sessions to promote motivation and teamwork, and mentors support for administrative clearances from data collection sites.

> Having previous leaders take part in other cohorts would build the capacity of the students to be able to conduct independent research … The way we have mentors who were in cohort one working with students, can't we also have the students who took part in the previous cohort work as peer mentors? This will enable them to stand on their own in research … They can also share the knowledge with other students. (Health profession undergraduate student, Mbarara)

> Getting clearance from the districts takes time … You find that you have missed a lot in class and you may not get time to compensate for that … You may get the lecture notes but miss the verbal communication from the lecturers in class which is not in the notes … Can the mentors help with such clearances? (Health profession undergraduate student, Lira)

Discussion

The findings from this evaluation summarize the perceptions of the participants regarding the acceptability, appropriateness, and feasibility of the program. Overall, they felt the HEPI-TUITAH program was successfully implemented. Specifically, participants expressed positive perceptions and views on processes, such as team formation, assigning of mentors, research capacity training, data collection, and pre-dissemination conference training, as having been key to the acceptability of the program. Participants also expressed that the inter-professional education approach, fitness of the micro-research program for undergraduate students, organization and presentation of the learning materials, and the mentor sessions provided by the

international partners (MGH) were very appropriate. Similarly, other perceptions of the participants were that the level of involvement, the commitment of the mentors, and the mentoring program as well as the knowledge and skills gained by the students contributed to the feasibility of the micro-research.

We designed the HEPI-TUITAH micro-research program to support training and mentoring activities at three rural institutions in Uganda that are involved in training health professions undergraduate students to fight against HIV/AIDS. We envisaged that the undergraduate students at the partnering institutions would gain experience working together in inter-professional teams through micro-research engagement. The period under evaluation had two cohorts of students participating in using different implementation approaches. This engagement was complicated by the unprecedented COVID-19 pandemic.

Accordingly, we designed a change management strategy of using a hybrid of asynchronous and synchronous method for training. For asynchronous learning, pre-recorded learning materials (audio and video) were uploaded online, while in-person training was for only team leaders together with their mentors.[18] We chose this method because it has been successfully used with undergraduate students elsewhere, it has the advantage of improving the independent learning ability and self-regulate thinking,[19] and the students are able to pause, rewind, and fast forward the content to process information at their own pace.[18,20] There was also a need to promote continuation of the program micro-research activities. However, the hybrid approach was not received well by all the participants, it was a demotivation to the team members who felt excluded from the in-person trainings. This situation is not unique to the HEPI-TUITAH micro-research program; similar barriers have been encountered in medical education.[21,22]

In this study, we used acceptability, appropriateness, and feasibility not only as outcome indicators for implementation[13] but also for assessing the implementation process.[12] Doing this was useful in showing us the strengths and weaknesses in the approach used. It provided a structure of short- and long-term improvement when handling the next set of undergraduate health professions students. We identified weaknesses in the implementation strategies from the traditional face-to-face approach used with the first cohort of micro-research student teams to the hybrid asynchronous and synchronous with the second one. The HEPI-TUITAH program being mid-way its implementation, these weaknesses need to be considered when planning for the next cohort of the micro-research student teams. Three take home messages from this evaluation are as follow:

(1) The interprofessional education approach used in training students from different programs and years of study together, and then letting them work in small groups on their research projects was perceived as valuable and promoted peer mentorship, teamwork, and academic collaboration. We used this approach to develop the health professions students as future interprofessional team members, as recommended by the Institute of Medicine.[5,7,8] Our participants (students and mentors) found the approach valuable in enhancing teamwork and collaboration. This approach has been used with both undergraduate and graduate health professions students in other studies and was found valuable.[8,23] Evidence shows that medical students are perceived to learn more from small-group sessions in medical education compared to lectures only.[24] According to Proctor et al: Acceptability is the perception among implementation stakeholders that a given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory, while Appropriateness is the perceived fit, relevance, or compatibility of the innovation or evidence-based practice for a given practice setting, provider, or consumer; and/ or perceived fit of the innovation to address a particular issue or problem.[12,13] Based on these definitions, the interprofessional education approach used in the HEPI-TUITAH micro-research program was acceptable and appropriate.

(2) There was a need to provide for institutional-based micro-research training activities in addition to the centrally organized ones so that all the team members, not just the team leaders can benefit. Although the HEPI-TUITAH strategy of training the micro-research student team leaders together with their mentors was perceived as beneficial in terms of best practices from a wider array of participants, it could only accommodate few people due to the COVID-19 restrictions on large gatherings. As a consequence, it is assumed that other team members missed out on the knowledge and skills gained by the team leaders. The participants (mentors) had no guarantee that the students were utilizing the pre-recorded learning materials to promote learning as intended by the program, thus their proposition for institutional based in-class training. Thus, the experiences with online learning were not perceived as the same as in-person and likely due to the absence of a live trainer who can guide the application of knowledge.[18,25]

(3) The need for the HEPI-TUITAH program to provide data collection experience for its micro-research health professions students during the unprecedented COVID-19 pandemic situation cannot be overstated. It calls for the HEPI-TUITAH program to think about the delicate balance of letting the undergraduate students gain the data collection experience without either compromising their interrupted undergraduate training or endangering them to the highly infectious disease in the name of research. Clearly, health research training for undergraduate medical education and allowing the students to participate in research activities is very important.[26,27] The health professions undergraduate students need to gain research skills which will help them in improved patient's care due to increased levels of knowledge and reasoning skills, as well as development of a positive work attitude.[28,29] In this study the mentors clearly stated that they found value in the training (as a form of professional development) and they found value in the publications they obtained. While for the students, the small amount of funds that were provided was a driver to engage in the research and appeared to have created a sense of motivation and accountability.

Strengths and Limitations

Our study had a number of strengths. Having different data sources (students and mentors from three different institutions) in the focus groups strengthened the results in this study and promoted synergy among the participants, allowing exploration of collective memories, experiences, positions, practices, and desires.[14] The participants provided insightful information that will be used as a catalyst for improving the last phase of the micro-research activities at MUST, BSU and LU. The study also had limitations including social desirability bias. Although our micro-research program seems to have several inherent benefits to the health professions students, we did not interview the institutional managers in this study for their perceptions about our engagement of students, and the sustainability prospects at the end of the HEPI-TUITAH funding. This component will, however, be included in the end-line evaluation.

Conclusions

The perceptions of students and mentors in the mid-term evaluation across the three partner institutions show that the HEPI-TUITAH micro-research program was largely acceptable, appropriate, and feasible for health professions undergraduate students. The interprofessional education approach of training students from different programs and years of study together was valuable and promoted peer mentorship, teamwork, and academic collaboration. Micro-funds appear to increase students' motivation and accountability, while faculty are motivated by training and opportunities to publish as currency to engage in mentoring students. However, there was a need to provide for institutional-based micro-research training activities in addition to the centrally organized ones, as well as data collection experiences for the undergraduate students even during unprecedented pandemics like COVID-19. These lessons will be applied to future training cohorts to optimize program impact and may be useful for similar programs in other settings.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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