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Integrative learning in US undergraduate public health education: Effective high-impact practices, volume II

Edited by
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Published in
Frontiers in Public Health

ISSN 1664-8714
ISBN 978-2-8325-3617-9
DOI 10.3389/978-2-8325-3617-9

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Integrative learning in US undergraduate public health education: Effective high-impact practices, volume II

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Citation

Rhodes, T. L., Hein, K. D., Harver, A., eds. (2023). *Integrative learning in US undergraduate public health education: Effective high-impact practices, volume II*. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-8325-3617-9

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frontiers in Public Health

PERSPECTIVE
published: 18 March 2022
doi: 10.3389/fpubh.2022.855712

Developing the Next Generation of Leaders in Health Policy and Management: Lessons From an Undergraduate Student-Led Organization

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OPEN ACCESS

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Specialty section:
This article was submitted to Public Health Education and Promotion, a section of the journal Frontiers in Public Health

Received: 15 January 2022
Accepted: 24 February 2022
Published: 18 March 2022

Citation:
Thomas C, Sandhu S, Li J, Sanders GD and Prvu Bettger J (2022) Developing the Next Generation of Leaders in Health Policy and Management: Lessons From an Undergraduate Student-Led Organization. Front. Public Health 10:855712. doi: 10.3389/fpubh.2022.855712

As health care continues to evolve, training the next generation of healthcare leaders is more important than ever. However, many university undergraduate students are not directly exposed to topics such as health policy and management within their coursework or co-curricular engagements. At Duke University, we developed the Student Collaborative on Health Policy (SCOHP) as an inter-disciplinary health policy hub that offers opportunities for learning, engagement, and leadership in the healthcare-related fields for students of all academic backgrounds. We see opportunity for similar student-led groups to be established by student leaders at other institutions, increasing interaction with experts, mentorship and the accessibility of experiential education, service, and leadership in the health care sector.

Keywords: education, undergraduate (MeSH), health policy, healthcare, management-healthcare, student organization

INTRODUCTION

Tackling tomorrow's health system challenges will require a workforce equipped with the tools to improve healthcare value and equity. With a national commitment to care re-design and payment reform, the next generation of healthcare leaders will need to work across sectors and professions, including clinical care, administration, public service, research, and industry. Universities can play a critical role in developing the pipeline of healthcare leaders, as early as at the undergraduate level.

Unfortunately, few universities offer undergraduate students adequate exposure to health policy and management through curricular and co-curricular programming. While some institutions include a health policy and management track within public health majors (1), these programs may only reach a small percentage of students interested in healthcare careers. There is a need for scalable and sustainable models to engage undergraduate students across degree programs.

One model for engagement is student organizations, which are effective outlets for students to develop leadership and professional skills, serve their local communities, and develop a supportive

network of peers with similar interests (2–4). At Duke University, we developed the Student Collaborative on Health Policy (SCOHP) in partnership with the Duke-Margolis Center for Health Policy. SCOHP's mission is "to unite students across disciplines and the University in a collaborative effort to increase awareness and opportunities in health policy" (5).

In this piece, we describe our process for developing our student organization's structure and opportunities for engagement. Our model and lessons learned can be a resource for students and health policy experts at other universities to partner to create their own student-led organizations or enhance existing graduate student organizations' (e.g., AcademyHealth student chapters, medical student advocacy initiatives) reach or include the undergraduate population. It is critical that awareness and access to opportunities in health policy begin earlier in the pipeline of preparing future leaders in all the facets of health and health care.

CRAFTING A STUDENT-ORGANIZATION STRUCTURE

The Duke-Margolis Center for Health Policy was established in 2016. Undergraduate students recognized a gap in the Center's strategic plan and established a student advisory committee to assess needs and co-design extracurricular opportunities in health policy and management with Center leadership. As engagement increased, students recommended establishing a formal organization. SCOHP was subsequently launched after a planning period in the 2018–2019 academic year. To become an official university-recognized student organization and eligible for funding support, we applied to our university's student government in 2019 (e.g., written constitution, proof of student interest and faculty advisor). After receiving approval, we advertised SCOHP to the student body via email, social media, and targeted presentations in healthcare-related classes. Interested students were invited to apply to join our executive board and attend a kick-off meeting, where students participated in a series of brainstorming activities to share their own interests to guide future projects.

SCOHP's organizational structure establishes several levels of leadership and advising structured around SCOHP's strategic priorities: campus engagement, education, career and professional development, service and advocacy (**Figure 1**). Leading the organization are two co-presidents (a primary president and a secondary president), who oversee the executive board. The executive board meets biweekly and consists of the co-presidents, treasurer, communications director, and co-chairs of committees. Each committee is led by two co-chairs, meets weekly or bi-weekly with a broader group of general body members, and carries out a variety of educational and service activities. The entire general body meets monthly for each committee to share updates. The executive board also meets monthly with a faculty and staff advisory committee from the Duke-Margolis Center to identify opportunities for collaborative efforts between SCOHP, Duke-Margolis, and the local community.

DEVELOPING OPPORTUNITIES FOR STUDENT ENGAGEMENT

We organized SCOHP activities and projects into four committees, one for each of our four priorities (**Table 1**). Within each committee, we designed four levels of engagement to ensure students had different points of access based on their interests, time available, and personal or professional goals. The SCOHP committee levels of engagement are: (1) learning about health policy and management, (2) developing real-world skills, (3) applying gained knowledge and skills through service, and (4) leading their peers.

First, students interested in gaining exposure to health policy can participate in SCOHP's Health Policy Week (hosted by our campus engagement committee in the fall semester), in which undergraduates engage with a different healthcare topic each day through guest speakers, forum discussions, and online resources. For a longitudinal learning experience, undergraduates looking to learn the basics about healthcare delivery and reform can enroll in a semester-long, for-credit "House Course," taught by members of our education committee under the mentorship of Duke-Margolis core and affiliate faculty. SCOHP organizes two to four House Courses each fall and spring semester and the registered students ranging from 7 to 18 per seminar meet once a week (online since spring 2020).

Second, students hoping to develop skills in health policy and management through experiential learning could compete in our annual case competition. Planned by our career and professional development committee, and sponsored by internal and external partner organizations, the case competition allows undergraduates to develop and pitch proposed solutions for real-world health challenges to a multi-sector panel of community member and faculty judges. Participating students also gain the opportunity to network with competition sponsors and explore opportunities to interview or intern with them.

Third, our service and advocacy committee provides students with the opportunity to apply knowledge and skills in health policy through service activities and academic-community partnerships. For example, in collaboration with a non-profit law firm, we recruited and trained students as Affordable Care Act Navigators to help community members enroll in health insurance (7).

Fourth, across all four committees and the executive board, students can develop leadership skills essential for successful careers in health policy and management. Students leading committees and projects learn to translate their ideas into action, organize and motivate their peers, and mentor the next generation of students to sustain their projects beyond their own SCOHP tenure. For example, in SCOHP's second year, students decided to launch a health policy and management podcast, "The Scope." Students developed skills in outlining 20-min episodes and developing scripts, networking with subject

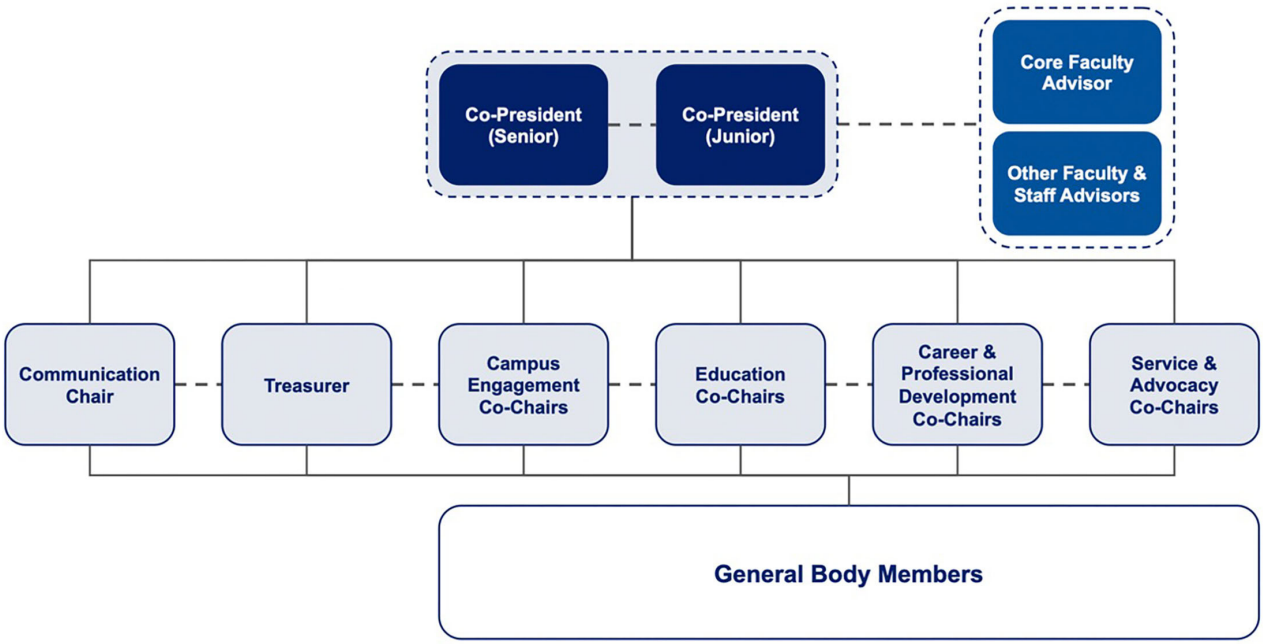

FIGURE 1 | Structure of student organziation.

matter experts, recording and editing podcasts, and creating handbooks to support their peers in leading their own episodes.

LESSONS LEARNED AND RECOMMENDATIONS FOR ADOPTING OUR MODEL

Based upon our experience of developing and implementing the SCOHP model, we have learned three primary lessons that may be useful for students and health policy educators to consider when adopting our model or adapting specific elements to an existing context.

Leveraging Existing Faculty and University Support

Essential to SCOHP's launch was faculty and staff mentorship through the Duke-Margolis Center. Our mentors fostered SCOHP's growth by collaborating on programming and facilitating academic-community partnerships for service activities. For example, our mentors' expertise was instrumental to developing a health policy career guide that best reflected the diverse career paths in the field. Our mutually-beneficial partnership also enabled the Duke-Margolis Center to expand its presence among undergraduates and have a direct connection to a large body of students with whom to share research and education opportunities.

Transitioning from an advisory committee to an official student organization allowed us to access University funds to support events targeting undergraduates, such as Health Policy Week, and to increase recruitment through student organization activity fairs and websites. We also leveraged our status as an official student organization to partner with more well-established student organizations (e.g., consulting clubs, politics and policy groups, and departmental organizations) to increase reach of SCOHP's programming. Students from other institutions with limited access to University funds should consider utilizing external resources. For example, our policy case competition has external sponsors and the AcademyHealth student chapters can apply for mini-grants and discounted conference registrations (8). Across approaches, we encourage students and faculty to be transparent about their goals and identify projects with most potential for synergy.

Fostering a Tiered, Mentorship Model to Ensure Organization Sustainability

Maintaining an organization with 100+ members requires thoughtful mechanisms to ensure progress and sustainability. First, our committee structure allows committees to implement several projects simultaneously and independently. Nonetheless, regular check-ins with a broader general body and executive board still create a culture of accountability and peer support. We also learned that structuring primary and secondary co-positions for all leadership levels facilitates peer mentorship and smooth transfers of leadership as students graduate or explore other roles within SCOHP. When starting an undergraduate student organization, we recommended co-presidents and co-chairs represent different years and that founders include 1st and 2nd year students in their executive board. Such an approach, coupled with mechanisms for knowledge sharing and documentation (e.g., archiving meeting

TABLE 1 | Examples of 2019–2021 Projects.

Project	Committee	Description	Reach	Level of engagement*
Health Policy Week	Campus Engagement	SCOHP organized and implemented a full week of programming to increase the student body's awareness of health policy issues. Topics included health disparities, environment and health, global reproductive health, and health policy in the 2020 election.	9 students partnered with 5 other student organizations to host two live events, disseminate a podcast, and publish an infographic.	1
Podcast	Campus Engagement	SCOHP members established a student-led health policy podcast, *The Scope.* Student broadcast journalists were encouraged to follow their interests in health policy, resulting in episodes covering the intersection of health care and artificial intelligence, state policy, child policy, environmental policy, and racial justice.	12 students encompassed the broadcast journalist team and released 18+ podcasts available on multiple platforms	1
House Courses	Education	Semester-long, for-credit seminars taught by undergraduates that meet weekly. Sponsored by Duke-Margolis faculty, courses include "Transforming the US Health Care System," "Health Care: A Human Right?," "Health Behind Bars," and "Drug Development for Essential Medicines."	152 undergraduate students enrolled in 12 SCOHP house course sections across the 2019–2020 and 2020–21 academic years.	1
Curricular Design	Education	SCOHP members partnered with Duke-Margolis faculty to explore feasibility of and undergraduate interest in new health policy curricular opportunities. This included for first-years (e.g., seminar courses, weekly faculty dinners, shared housing), and a health policy certificate program, as a pipeline to Duke-Margolis's existing undergraduate scholars program and health policy courses.	8 students led proposals provided to faculty for evaluation within academic programming considerations. Proposals were submitted to Duke University administration in fall 2021.	2
Case Competition	Career and Professional Development	SCOHP members established the first annual Health Policy Case Competition for undergraduates at Duke University. Competing students utilized business problem-solving to present policy solutions to real healthcare issues. Project leaders recruited sponsors, judges, and team mentors; wrote the case (i.e., COVID-19 vaccine equity in North Carolina); and managed event logistics.	6 students planned the case competition, to which 99 undergraduates applied and 50 participated.	2
Career Guide	Career and Professional Development	In partnership with Duke-Margolis faculty and Duke alumni, SCOHP members developed a comprehensive career guide for undergraduates seeking careers in health policy and management.	6 students developed the career guide, which was distributed widely to SCOHP and the Duke undergraduate student body.	1
Help Desk Initiative	Service and Advocacy	SCOHP members launched Help Desk volunteer program to train students as community resource navigators to address patients' social needs, such as food insecurity and housing instability, at a local Federally Qualified Health Center (6).	32 students trained as community resource navigators in summer 2020 and spring 2021 cohorts, serving 500+ patients.	3
Affordable Care Act (ACA) Navigators	Service and Advocacy	SCOHP members launched student volunteer ACA Navigators program, in partnership with Legal Aid of North Carolina, to help North Carolinians enroll in healthcare coverage (7).	34 students became certified ACA Navigators, serving community members at 25 partner sites.	3
COVID-19 Resource Directory	Service and Advocacy	During the COVID-19 pandemic, SCOHP members created and maintained a county-level directory of community resources for health and social needs (8). SCOHP partnered with the county public health department, local non-profits, and health systems to maximize reach and tailor efforts to meet local needs (9).	31 student volunteers curated directory of 370+ resources.	3

**1 = learning about health policy and management; 2 = developing real-world skills; 3 = applying gained knowledge and skills through service.*

notes and organizational materials in a shared Google Drive, creating best practices one-pagers for programs) enables the organization to sustain and scale after the founding team graduates.

Allowing for Multiple Levels and New Forms of Student Engagement

In our experience, students join SCOHP with varying levels of interest in health policy and engagement in the student organization. Creating low-touch (e.g., attending speaker events during our Health Policy week) and high-touch (e.g., leading and coordinating our annual case competition) opportunities for engagement can allow students to tailor their participation to best meet their needs. Inviting students to initiate projects that forge connections between health policy and their own academic and professional interests (e.g., climate change, mental health, racial justice) has been crucial for retaining students. Additionally, faculty advisors can help students identify

geographically relevant health policy projects. For example, many of our service projects relate to addressing health-related social needs, given North Carolina's recent push to integrate health and social services through Medicaid reform (10). Several research projects are connected with global health priorities. Regardless of how project ideas are sourced, we recommended club leadership consider how to produce "value-add" initiatives that do not duplicate existing curricular or extra-curricular offerings.

CONCLUSION

Our experience with SCOHP provides a model for undergraduate student engagement in health policy and management that other universities can replicate and adapt in their local contexts and for students at any or all learning levels. We encourage students and educators to consider partnering to create meaningful opportunities to inspire the next generation of health care and health policy leaders.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

CT, SS, and JL drafted the manuscript. GS and JP revised the manuscript critically for important intellectual content and all authors approved of the version of the manuscript to be published. All authors were involved in the conception and implementation of the project.

ACKNOWLEDGMENTS

We would like to thank Sarah Dunn Phillips and the SCOHP executive board members from 2019 to 2021 for their contributions to the development of this model. We look forward to collaborating with other institutions to expand opportunities nationwide.

REFERENCES

1. Tarasenko YN, Lee JM. U.S. Undergraduate education in public health: hot or not? *Front Public Health*. (2015) 3:71. doi: 10.3389/fpubh.2015.00071
2. Smith LJ, Chenoweth JD. The contributions of student organization involvement to students' self-assessments of their leadership traits and relational behaviors. *Am J Bus Educ*. (2015) 8:279–88. doi: 10.19030/ajbe.v8i4.9422
3. Zeeman JM, Bush AA, Cox WC, Buhlinger K, McLaughlin JE. Identifying and mapping skill development opportunities through pharmacy student organization involvement. *AJPE*. (2019) 83:6950. doi: 10.5688/ajpe6950
4. Soria K, Troisi J, Stebleton M. Reaching out, connecting within: community service and sense of belonging among college students. *High Educ Rev*. (2012). 9:65–8.
5. *Duke Student Collaborative on Health Policy*.https://sites.duke.edu/dukescohp/ (accessed June 5, 2021)
6. Sandhu S, Xu J, Blanchard L, et al. A community resource navigator model: utilizing student volunteers to integrate health and social care in a community health center setting. *Int J Integr Care*. (2021) 21:2. doi: 10.5334/ijic.5501
7. Hallur S, Sandhu S, Herold E. Embedding student volunteer affordable care act navigators in a primary care clinic. *Ann Fam Med*. (2022). doi: 10.1370/afm.2794. [Epub ahead of print].
8. *Student Chapter Mini Grants*. AcademyHealth. https://academyhealth.org/page/student-chapter-mini-grants (accessed December 31, 2021).
9. Sandhu S, Lemmon ME, Eisenson H, Crowder C, Bettger JP. Addressing the social determinants of health during the COVID-19 pandemic: ensuring equity, quality, and sustainability. *Fam Community Health*. (2021) 44:78–80. doi: 10.1097/FCH.0000000000000290
10. Wortman Z, Tilson EC, Cohen MK. Buying health for North Carolinians: addressing nonmedical drivers of health at scale. *Health Aff*. (2020) 39:649–54. doi: 10.1377/hlthaff.2019.01583

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Public Health

ORIGINAL RESEARCH
published: 24 March 2022
doi: 10.3389/fpubh.2022.790406

Preparing Students for the Public Health Workforce: The Role of Effective High-Impact Educational Practices in Undergraduate Public Health Program Curricula

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OPEN ACCESS

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Specialty section:
This article was submitted to Public Health Education and Promotion, a section of the journal Frontiers in Public Health

Received: 06 October 2021
Accepted: 28 February 2022
Published: 24 March 2022

Citation:
Armstrong-Mensah EA, Ramsey-White K, Alema-Mensah E and Yankey BA (2022) Preparing Students for the Public Health Workforce: The Role of Effective High-Impact Educational Practices in Undergraduate Public Health Program Curricula. Front. Public Health 10:790406. doi: 10.3389/fpubh.2022.790406

There are several institutions of higher learning in the United States that award degrees in public health to undergraduate students. While these institutions serve as potential pipelines for the public health workforce, it is unclear if the curricula and training students receive from these institutions, really prepare them for the public health workforce or higher education. The questions sometimes asked are whether the programs offered by these institutions exist to provide students with a good understanding of public health issues so they can become good citizens for building a responsible society, or if it is to prepare students for graduate school. Regardless of what the goals are, students in undergraduate public health programs need to be exposed to curricula that adequately prepare them to enter well-defined careers in public health. Thus, institutions of higher learning offering degrees in public health to undergraduate students need to understand the market, assess, and understand the needs of public health agencies, and tailor course curricula to match those needs. Georgia State University established its undergraduate public health program in 2016. Since then, over 200 students have graduated from the program. The purpose of the study was to assess student perception of the role of high impact educational practices such as study abroad, signature experience, and undergraduate research curricula in preparing them for careers in public health.

Keywords: high-impact educational practices, public health workforce, undergraduate public health curriculum, study abroad, signature experience, undergraduate research

INTRODUCTION

High-impact educational practices (HIPs) are practices that promote deep learning through student engagement. They focus on the knowledge, attitudes, and skills college students need to succeed academically and professionally. HIPs have the ability to transform students' personal development and educational growth, as well as to improve the quality of students' experience, learning,

retention, and success (1). These educational practices also afford students the opportunity to participate in activities beyond the classroom, resulting in learning and personal development (2). HIPs not only enable students to apply what they have learned; they also contribute to metacognitive gains by students (3).

HIPs take various forms and include study abroad, signature experience, first year seminars, learning communities, writing intensive courses, collaborative research, and undergraduate research, all of which have been widely tested and found to be beneficial to the cumulative learning of college students enrolled in all types of programs (4, 5). HIPs are powerful educational practices in that, they require applied, hands-on, integrative, and often collaborative learning experiences. Georgia State University (GSU), a large, urban, public research institution located in the heart of Atlanta, Georgia, serves over 400 undergraduate students in the Bachelor of Science in Public Health (BSPH) program. At GSU, students across the university including those within the School of Public Health (SPH) have access to a variety of HIPs opportunities including study abroad, signature experience, and undergraduate research.

Opportunities to study abroad continue to be a popular choice for college students in the United States (US) looking to expand their undergraduate education. Per figures released by the Open Doors Report on International Educational Exchange, about 273,996 US students studied abroad for credit during the 2010-2011 academic year (6). Participating in such opportunities have helped to develop students' global and intercultural competencies (7). Corroborating this fact, Braskamp et al. (8) found that education abroad increases student intercultural competence, intercultural maturity, and intercultural sensitivity. Signature experience courses make learning come alive and provide real-world engagement with course content for students.

Public health signature experiences give public health majors the opportunity to integrate, synthesize and apply their public health knowledge through cumulative and experiential activities. As part of the course offering, students usually complete a variety of projects, and written assignments designed to assess their acquisition of the required public health competencies covered within the public health major. The course encompasses a holistic review of the field of public health while integrating student reflection on what they have learned and how they may apply their knowledge to future educational and career aspirations.

The GSU BSPH program is a generalist degree with a focus on urban and global health. The interdisciplinary makeup of the faculty and the diverse research projects currently underway in the school presents fertile ground for students to have diverse, experiential learning opportunities. The GSU BSPH program seeks to prepare students for work across public health disciplines, and to equip graduates with cross-professional competencies for public health jobs with local and global public health organizations. While GSU BSPH programs serve as a pipeline for the public health workforce, the question is whether the curricula of the courses offered actually prepare students to competently enter the public health workforce or to pursue graduate education. To date, no study has been conducted to assess the perception of students on whether the HIPs associated with GSU BSPH program curricula adequately prepares them for careers in public health. Thus, the purpose of the study was to assess student perceptions of the role of HIPs such as study abroad, signature experience, and undergraduate research curricula, in preparing students for careers in public health.

MATERIALS AND METHODS

Setting and Population

The GSU SPH offers six-degree programs (Bachelor of Science in Public Health; Master of Public Health; Graduate Certificate in Public Health; Graduate Certificate in Maternal and Child Health; Doctor of Philosophy; and the Doctor of Public Health) and serves over 700 students across all programs. The student body comprises traditional and non-traditional students from diverse racial and socio-economic backgrounds. The GSU BSPH program seeks to equip students with interdisciplinary understanding of public health, using a variety of approaches and course work. Consequently, students enrolled in these programs gain knowledge and acquire skills needed for graduate school, and careers in a wide range of public health and interdisciplinary professions.

Sampling and Data Collection

Using purposive sampling, we conducted a cross-sectional study to assess GSU BSPH student perceptions of the role of HIPs in preparing them for careers in public health. Students enrolled in the program during the summer and spring of 2021 were informed about and invited to participate in the study through faculty announcements, emails, and information posted on iCollege, the university's learning management system. Students were informed that the study was voluntary and that they could decide not to participate. Students who volunteered to participate in the study indicated their consent to participate by completing an electronic questionnaire created in Qualtrics. To uphold student confidentiality and privacy, no personally identifiable information was collected. The GSU institutional review board (IRB) determined that the study was exempt from federal regulation.

Variables and Measurement

The data collection instrument comprised 15 multiple choice and closed ended questions across five domains – i) demographic and academic information. ii) GSU BSPH program curricula, iii) study abroad, iv) signature experience, and v) undergraduate research. The demographic and academic information domain questions focused on student academic status, gender, age, and race. The GSU BSPH program curricula domain questions focused on whether the program curricula prepare students for jobs in public health. The study abroad domain questions focused on whether GSU study abroad programs are designed in a way that help students to develop global fluency skills for future careers in public health. The signature experience domain included questions on whether the GSU BSPH signature experience course prepares students to be successful at interviews. It also focused on whether students are able to articulate the knowledge and skills they have acquired from the program, and whether students thought the program

equipped them with the competencies required for entry level public health jobs. The undergraduate research questions focused on student perceptions of the relevance of research for professional advancement, whether the GSU BSPH program gives undergraduate students research opportunities, and the research skills students possess.

Statistical Analysis

Collected data in Qualtrics was cleaned and exported to SAS version 9.4 for analysis. Descriptive, bivariate, and multivariate logistic regression analysis were conducted at a confidence level of alpha = 0.05. Missing quantitative data were excluded from calculations. In cases where "No" responses were below 5, and thus, too small to be analyzed alone, they were combined with "Do not know" responses [shown in the relevant rows in the multivariate (**Table 1**)]. One response registered as unknown for gender was dropped in the multivariate analysis, since this response could not be analyzed alone or combined with either of the two responses for the gender category. Descriptive analysis was conducted to summarize data. Multivariate analysis was conducted to assess the relationship between whether GSU BSPH curricula including associated factors (study abroad, signature experience, and undergraduate research) prepares students for jobs in public health.

RESULTS

Univariate Statistics

Demographic and Academic Information

A total of the 64 students enrolled in the GSU BSPH program participated in the survey. Of this number, 1.6% was a freshman, 15.5% were sophomores, 34.4% were juniors, and 48.4% were seniors. The majority of students (78.1%) self-identified as female and were within the 18–24 years age range (71.9%) (**Table 2**).

GSU BSPH Program Curricula

Concerning the GSU BSPH program curricula and whether it prepares undergraduates for public health jobs, 38% of students stated that they did ("yes"), 8.1% thought otherwise ("no"), and 30.6% said they did not know. The majority of participants (68.9%) stated that the GSU BSPH program curricula prepares students for graduate education. Not as many students (1.6%) thought otherwise (**Table 2**).

Study Abroad

As shown in **Table 2**, regarding whether GSU study abroad programs help students develop global fluency skills for careers in public health, 33.3% of students answered in the affirmative ("yes"), while 66.7% of students did not take a stand as they said they had not yet participated in any GSU study abroad program. No student indicated that the programs were not helpful. Most students (18.1%) indicated that GSU study abroad programs help to equip students with cultural sensitivity skills and teaches students how to be respectful of people from other cultures (18.1%). According to 15.3% of students, GSU study abroad programs create a "willingness to serve" attitude among students (**Table 2**).

Signature Experience

A little over a fourth of students (26.8%) indicated that the GSU signature experience course helps students to demonstrate behaviors that will help them perform well in real job situations globally and locally. 73.2% of the students said they did not know as they were not yet seniors. Regarding competencies required for entry level public health jobs, some students (13.9%) said that the course equips students with the ability to analyze public health issues, think critically (18.1%), develop interpersonal skills (12.5%), solve problems (13.9%), acquire leadership skills (13.9%), and to communicate public health issues (13.9%). Over half of the students (54.2%) did not have an opinion on the matter as they had not yet taken the signature experience course. In response to whether the GSU signature experience course prepares students for job interviews, 18% of students said "yes" and 1.8% said "no". Some students (80%) stated that they did not know. About a third of students (30.4%) reported that the GSU signature experience course helps students articulate their public health knowledge and skills (**Table 2**).

Undergraduate Research

As presented in **Table 2**, 71.4% of students who participated in the study indicated that the GSU BSPH program provides opportunities for undergraduate research compared to 8.9 % who did not think so. Per the majority of students (89.3%), participating in undergraduate research is relevant for professional advancement. Some research skills students listed they have as a result of participating in undergraduate research are doing literature review (45.8%), annotated bibliography (51.4%), data collection (45.8%), data analysis (51.4%), academic writing (55.6%), critical thinking (65.3%), and doing citations (58.3%) (**Table 2**).

Bivariate and Multivariate Analysis

We conducted bivariate analysis to examine the relationship between student perceptions of whether the GSU BSPH program curricula prepares students for jobs in the public health workforce, (dependent variable), and study abroad, signature experience, and undergraduate research (independent variables). We also looked at the relationship between GSU BSPH program curricula and student's preparation for the degree program. In the bivariate logistic regression model those who agreed that the GSU BSPH curricula prepares students for graduate education also firmly attested that the GSU BSPH curricula prepares students for jobs. (Unadjusted OR: 8.96, p-value = 0.001) (**Table 3**). Increased odds for preparedness for jobs was observed for all HIPs variables with undergraduate research program being the most significant (**Table 3**).

In the adjusted logistic regression model, when controlling for perceptions on study abroad, signature experience, undergraduate research curricula, gender, academic status, age, and race, we found that the odds that the GSU BSPH curricula prepares students for jobs among students who said the GSU BSPH curricula prepares students for graduate education increased (AOR 30.83, p-value 0.001) in relation to their counterparts (**Table 1**). In this model, students who said that the GSU BSPH program curricula provides them with

TABLE 1 | Multivariate analysis of GSU BSPH program curricula prepares students for jobs and other BSPH curricula associated factors (study abroad, signature experience and undergraduate research).

Variables	Odds ratio	*P*-value	95% Confidence interval
Undergraduate research			
Would you say that the GSU BSPH program provides students with research opportunities? Yes/I do not know	6.76	0.035	1.15–39.82
Study abroad			
Would you say that GSU study abroad programs are designed in a way that helps students to develop global fluency skills for future careers in public health? Yes/Have not participated	1.71	0.242	0.70–4.23
Signature experience			
Would you say that the GSU signature experience course teaches students how to articulate the knowledge and skills they have acquired from the program? Yes/I do not know	0.95	0.924	0.37–2.69
GSU BSPH program curricula			
Would you say that the GSU BSPH program curriculum prepares students for graduate education? Yes/No	30.83	0.001	4.27–222.47
Demographics			
Gender: male vs. female	0.27	0.235	0.03–2.32
Academic status: junior to senior	1.20	0.735	0.43–3.36
Age, 18–24 yrs vs. 25+	0.15	0.094	0.02–1.38
African American vs. all other	0.90	0.615	0.59–1.37

research opportunities also showed an increased likelihood that the program prepared them for a job in comparison to their counterparts (AOR 6.76, p-value = 0.035 (**Table 1**). A non-significant increased adjusted odds ratio was also observed for study abroad (AOR 1.71, p-value = 0.242), as well as higher academic status (AOR 1.20, p-value = 0.735) in relation to preparedness for the job market (**Table 1**).

African American students were less likely to say that the GSU BSPH program curricula prepares students for jobs compared to all other race, although this was not significant (AOR =0.90, p-value = 0.615). Males showed a decreased likelihood of preparedness for jobs compared to females; although this was also not significant (AOR =0.27, p-value = 0.235) (**Table 1**).

DISCUSSION

The study was conducted to assess student perceptions of the role of high impact learning practices such as study abroad, signature experience, and undergraduate research curricula, in preparing students for careers in public health. Findings from the study provide information on whether students felt that the HIPs associated with GSU BSPH program curricula adequately prepares them for careers in public health. The findings also provide a baseline for future assessments.

GSU BSPH Program Curricula

The GSU BSPH degree program has a generalist curriculum that includes elements of the life and biological sciences, social sciences, and humanities to provide students with an understanding of public health from a broad spectrum of approaches. Students enrolled in the program acquire the knowledge and skills needed to excel in a wide array of public health professions, or to pursue graduate education in the medical, science, social science, or public health fields. Prior to the study, we were convinced that the program's curricula did provide students with a solid foundation to immediately enter the public health workforce and for graduate education. Study results corroborated this conviction as 61.3 and 68.9% of students, respectively indicated that the BSPH curricula does prepare students for jobs and graduate education. This was also affirmed in the multivariate regression model. The GSU BSPH curricula achieves its aims in preparing students for the job market.

Study Abroad

The Brazil, Dominican Republic, China, Ghana, India, and Uganda are the six countries where students enrolled in the BSPH program have had the opportunity to visit and explore different cultures and life experiences. These programs are typically offered in the summer semester and are led by full-time faculty from the SPH, as well as by faculty from other departments at GSU - geosciences, criminal justice, and communications. Students who participated in these programs indicated in course evaluations that, studying abroad gave them the opportunity to acquire skills such as analyzing public health issues (13.9%), critical thinking (18.1%), problem solving (12.5%), communication of public health issues (13.9%), leadership (12.5%), and intercultural fluency (33%) that they need for their future careers in public health. This is consistent with Gonyea's discovery that studying abroad has a positive impact on student development (9), as well as Lander & Malnarich's observation that studying abroad fosters transformational learning experiences and the development of global citizenship (10).

TABLE 2 | Descriptive characteristics of participants by five identified domains.

Variables	Sample size, *n*	Percentage, %
1. Demographics and academic information		
Academic status		
Freshman	1	1.6
Sophomore	10	15.6
Junior	22	34.4
Senior	31	48.4
Total	64	100.0
Age		
18–24 years	46	71.9
25–30 years	5	7.8
30+	13	20.3
Total	64	100.0
Gender		
Male	13	20.3
Female	50	78.1
Other	1	1.6
Total	64	100.0
2. GSU BSPH program curricula		
GSU BSPH curricula prepares students for jobs		
Yes	38	61.3
No	5	8.1
I do not know	19	30.6
Total	62	100
GSU BSPH curricula prepares students for graduate education		
Yes	42	68.9
No	1	1.6
I do not know	18	29.5
Total	61	100.0
3. Study abroad		
GSU study abroad programs help students develop global fluency skills for careers in public health	20	33.3
Yes		
No	-	-
I have not participated in study abroad	40	66.7
Total	60	100.0
GSU study abroad programs equip students with careers in public health (Multiple)		
Empathy	6	8.3
Cultural sensitivity	13	18.1
Respect for others	13	18.1
Willingness to serve	11	15.3
I have not participated in study abroad	48	66.7
4. Signature experience		
GSU signature experience course designed to helps students demonstrate behaviors that will help them perform well in real-world job situations		
Yes	15	26.8
No	-	-
I have not participated in signature experience	41	73.2
Total	56	100.0

(Continued)

TABLE 2 | Continued

Variables	Sample size, *n*	Percentage, %
Competencies required for entry level public health careers that GSU signature experience course helps students acquire (Multiple)		
Analysis of public health issues	10	13.9
Critical thinking	13	18.1
Interpersonal skills	9	12.5
Problem solving	9	12.5
Leadership skills	9	12.5
Communication of public health issues	10	13.9
I have not participated in signature experience	39	54.2
The GSU signature experience course prepares students for job interviews		
Yes		
Yes	10	18.2
No	1	1.8
I do not know	44	80.0
Total	55	100
GSU signature experience course teaches students how to articulate the knowledge and skills they have acquired from the program		
Yes	17	30.4
No	-	-
I do not know	39	69.6
Total	56	100
5. Undergraduate reserach		
GSU BSPH program provides students with research opportunities	40	71.4
Yes		
No	5	8.9
I do not know	11	19.6
Total	56	100
Participating in undergraduate research is relevant for professional advancement		
Yes	50	89.3
No	3	5.4
I do not know	3	5.4
Total	56	100
Which research skills do you have (Multiple)		
Literature review	33	45.8
Annotated bibliography	37	51.4
Data collection	33	45.8
Data analysis	37	51.4
Academic writing	40	55.6
Critical thinking	47	65.3
Doing citations	42	58.3
None	3	4.2

Signature Experience

Seniors in the GSU BSPH program complete the signature experience course as part of their culminating experience. This course is implemented in two sections - PHPH/PHPB 4991 and PHPH/PHPB 4992. PHPH/PHPB 4991 serves as the prospectus (planning) course for an experiential, hands on- project that is executed in PHPH/PHPB 4992, the capstone course (11). Both courses are offered every semester in a 7-week mini-mester and can be taken in a single semester. The prospectus course (4991), the first of the two-course sequence, is required to meet the area H requirements (Public Health Signature Experience) of the BSPH program of study. With this section, students have the opportunity to integrate, synthesize and apply their public health knowledge through cumulative and experiential activities

TABLE 3 | Bivariate analysis of GSU BSPH curricula, study abroad, signature experience, and undergraduate research v. prepares students for jobs.

Variables	Odds ratio	*P*-value	95% Confidence interval
GSU BSPH program curricula			
Would you say that the GSU BSPH program curriculum prepares students for graduate education? Yes/No	8.96	0.001	2.58–31.08
Study abroad			
Would you say that GSU study abroad programs are designed in a way that helps students to develop global fluency skills for future careers in public health? Yes/Have not participated	1.31	0.350	0.74–2.33
Signature experience			
Would you say that the GSU signature experience course is designed in a way that helps students to demonstrate behaviors that will help them perform well in real-world job situations? Yes/Have not taken the course	1.40	0.316	0.73–2.68
Would you say that the GSU signature experience course prepares students for job interviews? Yes/I do not know	2.92	0.205	0.56–15.35
Would you say that the GSU signature experience course teaches students how to articulate the knowledge and skills they have acquired from the program? Yes/I do not know	1.29	0.411	0.70–2.38
Undergraduate research			
Would you say that the GSU BSPH program provides students with research opportunities? Yes/ I do not know	4.39	0.018	1.29–14.99
Would you say that participating in undergraduate research is relevant for professional advancement? Yes/ I do not know	6.72	0.055	0.96–47.07
Demographics			
Age, 18–24 yrs vs. 25+	0.57	0.359	0.17–1.89
Academic status: junior to senior	1.12	0.734	0.58–2.15
Gender: male vs. female	0.58	0.402	0.16–2.07
Race: African American vs. all other races	0.90	0.406	0.70–1.16

designed to assess student acquisition of the required public health competencies covered within the public health major (11).

Students have the option to execute the signature experience course sections in a variety of settings including the classroom, global/study abroad courses, and community-based service projects (11). Both course sections utilize HIPs that are highly engaging and relevant to the coursework that students have completed up to this point in their program of study. Some of the active learning practices include opportunities for students to engage in undergraduate research, study abroad programs, collaborative assignments, integrative projects, and writing intensive assignments (11).

Among the students who said they had participated in the signature experience course, 26.8% said the course helped them to demonstrate behaviors needed for future careers in public health, 13.9% said it helped them to think critically, 18.1% said they were able to acquire interpersonal skills, 12.5% said they learned how to problem solve, 12.5% said the acquired leadership skills, and 18.2% said they gained the ability to communicate public health issues. 18.2% of the students said the course prepared them for job interviews and 30.4% said it helped them to articulate the knowledge and skills they acquired from the GSU BSPH program. According to Aboagye (12), signature experiences are designed to help students think critically, appreciate diversity, and live successfully in a complex rapidly changing world.

Undergraduate Research

While not all students enrolled in the GSU BSPH program indicated that the program provides them with research opportunities, the majority (71.4%) responded in the affirmative. Most students (89.3%) saw the relevance of undergraduate research for professional advancement. This is consistent with Lopatto's findings that the undergraduate research experiences affect student career plans (13). Dr. Armstrong-Mensah, the lead author of this paper founded and launched the GSU SPH Research and Publication Club in 2018 in response to persistent student requests to do research with faculty. The goal of the club is to build and improve upon the research and writing skills of undergraduate and graduate students, and to give them the opportunity to co-author peer-reviewed publications prior to graduation. In 2018, 25 students signed up with the club's first cohort. To date, 69 BSPH and Master of Public Health (MPH) students have participated in the club and written 23 manuscripts – 11 of these manuscripts have been published, three have just been accepted and are in print, and journal editors just provided comments for two more submissions. The remaining seven manuscripts are in the works to be submitted to peer reviewed journals by the end of fall 2021.

Mentored research within the GSU BSPH program is helping students to think analytically, question critically, be persistent, and to discover the steps involved scientific inquiry. In their study, Nagda et al. found that participating in undergraduate research opened career pathways for students (14) and Kremer et al. indicated that such opportunities led to undergraduate

student pursuit of higher education prior to entry into the workforce (15).

Study Limitations

While study results show that the utilization of HIPs in the GSU BSPH program prepares students for the public health workforce and even graduate education, many of the students had not participated in study abroad (66.7%) and signature experience (73.2) courses. To address this challenge, future studies on this issue will focus only those undergraduate students who have participated in all the HIPs focused on in the study. It must be noted that all GSU BSPH students take the signature experience course toward the end of their senior year, and thus do not miss out on this opportunity. While studying abroad is an effective HIP, it is an optional course at GSU as with most universities because, not all students have the financial means to pay for an international trip even after receiving some assistance in the form of a scholarship. In addition, in as much as some students would like to study abroad, they may not have any elective or an academic course left in their academic pathway that they can use and which would allow them to use FAFSA funds to pay for tuition for the course. This notwithstanding, students benefit from other HIPs in the curriculum that also prepares them for the public health workforce.

CONCLUSION

The study focused on three HIPs (study abroad, signature experience, and undergraduate research) utilized in the GSU BSPH program curricula and assessed student perceptions of the role those HIPs play in preparing students for careers in public health. Results from the study showed that the perceived value of HIPs associated with the GSU BSPH program curricula contribute to the preparation of undergraduate students to enter the public health workforce as well as for graduate education. Our sample size and percent of students who had participated in the HIPs was small and thus, prevents us from concretely concluding that the HIPs used in the GSU BSPH curricula prepares undergraduate students to enter the public health workforce. The results provide baseline data for future assessments.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary files, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Georgia State University Institutional Review Board. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

EAA-M wrote the draft manuscript and finalized the manuscript. EAA-M and KR-W edited the final manuscript. EA-M and BY performed the statistical analysis. All authors reviewed and approved the final manuscript.

ACKNOWLEDGMENTS

We thank faculty in the BSPH program at Georgia State University who, continue to work with and inspire the students in our program and for their help with announcing the survey and encouraging students to participate.

REFERENCES

1. CSUB. *What are High Impact Practices? [Internet]*. (nd.). Available online at: https://www.csusb.edu/trc/programs/high-impact-practices-hips
2. Brownell JE, Swaner LE. Five *High-Impact Practices: Research on Learning Outcomes, Completion, and Quality*. Washington, DC: Association of American Colleges and Universities. (2010).
3. Ambrose SA, Bridges MW, DiPietro M, Lovett MC, Norman MK. *How Learning Works: Seven Research-Based Principles for Smart Teaching. San Francisco, CA: Jossey-Bass*. (2010).
4. Kuh GD. What student affairs professionals need to know about student engagement? *J Coll Stud Dev*. (2009) 50:683–706. doi: 10.1353/csd.0.0099
5. Kuh GD. *High-Impact Educational Practices: What They Are, Who Has Access to Them, and Why They Matter*. Washington, DC: Association of American Colleges and Universities. (2008).
6. Institute of International Education (2012). *Open doors report. [Internet]*. (2012). Available online at: www.iie.org/opendoors
7. Stebleton MJ, Soria KM, Cherney BT. The High Impact of Education Abroad: College Students' Engagement in International Experiences and the Development of Intercultural Competencies. *Frontiers: Interdiscipl J Study Abroad*. (2013) 22:1–24. doi: 10.36366/frontiers.v22i1.316
8. Braskamp LA, Braskamp DC, Merrill KC. Assessing progress in global learning and development of students with education abroad experiences. *Frontiers: Interdiscipl J Study Abroad*. (2009) 13:101–18.
9. Gonyer RM. *The impact of study abroad on senior year engagement. [Internet]*. (2008.). Available online at: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.169.7047&rep=rep1&type=pdf
10. Lardner E, Malnarich G. A new era in learning: why the pedagogy of intentional integration matters. *Change*. (2008) 40:30–7. doi: 10.3200/CHNG.40.4.30-37
11. Georgia State University. *Bachelor of Science in Public Health Handbook 2020-2021. [Internet]*. (2020). Available online at: https://publichealth.gsu.edu/files/2020/06/BSPH-Handbook-2020-2021.pdf
12. Aboagye E. 2011. Developing signature learning experiences: a case study of an institution's transformative journey towards global citizenship and equity. *J Global Citizen Equity Edu*. (2011) 1:1–23.
13. Lopatto D. Undergraduate research as a high-impact student experience. *Front Peer Rev*. (2010) 12:25–30. doi: 10.1128/jmbe.v21i1.2047
14. Nagda B, Gregerman S, Jonides J, von Hippel W. Lerner, JS. Undergraduate student-faculty research partnerships affect student retention. *Rev High Ed*. (1998) 22:55–72.

15. Kremer JF, Bringle RG. The effects of an intensive research experience on the careers of talented undergraduates. *J Res Develop Education.* (1990) 24:1–5. doi: 10.1128/jmbe.v17i2.1003

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frontiers | Frontiers in Public Health

CURRICULUM, INSTRUCTION, AND PEDAGOGY
published: 18 April 2022
doi: 10.3389/fpubh.2022.864891

Creating an Integrated Undergraduate Public Health Curricula: Inspiring the Next Generation to Solve Complex Public Health Issues

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OPEN ACCESS

Edited by:
Andrew Harver, University of North Carolina at Charlotte, United States

Reviewed by:
Karin Joann Opacich, University of Illinois at Chicago, United States
Maria João Guimarães Fonseca, Museu de História Natural e da Ciência, Universidade do Porto, Portugal

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Specialty section:
This article was submitted to Public Health Education and Promotion, a section of the journal Frontiers in Public Health

Received: *29 January 2022*
Accepted: *22 March 2022*
Published: *18 April 2022*

Citation:
Osiecki K, Barnett J and Mejia A (2022) Creating an Integrated Undergraduate Public Health Curricula: Inspiring the Next Generation to Solve Complex Public Health Issues. Front. Public Health 10:864891. doi: 10.3389/fpubh.2022.864891

This article takes a novel approach of highlighting the creation and development of an integrated undergraduate public health curricula geared to students in the health sciences. In our practice, undergraduate and public health pedagogy supports innovative and proven approaches of experiential learning in our classrooms. We show how public health faculty take a team approach to teaching which has allowed them to collaborate in and outside of the classroom resulting in inherent knowledge of course materials, student engagement, and outcomes. This evolved to an overall curricula design that involves scaffolded research skills and/or projects within and between the public health courses. In addition, we highlight examples of upperclassmen utilizing these curriculum schemas outside the classroom to engage in faculty research beyond the public health discipline. This narrative describes lessons learned when teaching undergraduate students across public health curricula, how we integrated research skills within each course using pedagogical practices, and why this approach supports student engaged research within directed study and paid undergraduate research opportunities.

Keywords: public health curriculum, undergraduate research, experiential learning, integrated courses, engaged activities

INTRODUCTION: BACKGROUND AND RATIONALE FOR THE EDUCATIONAL ACTIVITY INNOVATION

U.S. public health workplace shortages have existed for decades (1) with a chronic underfunding of public health infrastructure (2, 3). In 2020, several public health emergencies converged highlighting challenges with the United States (U.S.) health care systems, public health infrastructure, and emergency preparedness and response programs. An unprecedented pandemic, racial tensions and police violence, and extreme climate change-related disasters strained the almost $4-trillion budget allocated to health care of which only 3% is designated for public health initiatives (4). The Association of Schools and Programs of Public Health, Framing the Futures Initiative, and the accreditation by the Council on Education for Public Health (CEPH) called for the expansion of stand-alone undergraduate degree programs (5, 6), which gained momentum within the last decade. In recent years, undergraduate public health programs and degrees grew in popularity including 75,165 undergraduate public health degrees awarded from 271 institutions during 2003–2016, with over half conferred from 2011 to 2016 (5).

Undergraduate public health program frameworks, models, and standards provide recommended courses and curriculum outcomes (6–8). In 2014, literature on undergraduate public health education in the U.S. garnished only 23 articles, with two on teaching assessment and two on public health career choices (3). Recent studies support the importance of undergraduate public health degree programs emphasizing the recruitment of a diverse student body and designing curricula geared toward an undergraduate population (5, 6). From our experience, few undergraduate students can explain public health within the reflection essays assigned in the introductory public health course. With this overview, we contribute to the body of literature by mapping seven undergraduate public health courses within two sample plans: math and science or social sciences. These two plans help students choose complementary courses in a health science degree program to pursue graduate school or a career in public health professions. For example, the math and science plan meet prerequisites for environmental health, industrial hygiene, or biostatistics while the social science plan prepares students for community health promotion or maternal and child health. Public health plans are flexible so students can work with their coach to choose courses based on their needs and future goals. The public health course series incorporates experiential learning, engaged activities and high impact practices. This article examines lessons learned including unintentional missteps in curriculum design, pedagogical theory that frames our courses, and implications outside the classroom.

PUBLIC HEALTH AND THE PEDAGOGY OF ACTIVE LEARNING

Numerous studies address the importance of introducing medical students to public health, health disparities, and population health curricula to address quality of care beyond individual treatment (9–12). In response to this research, the University of Minnesota Rochester (UMR) requires undergraduate health science students to take an introduction to public health course. Although some students have heard of public health, most have little or no understanding of the field. As public health course enrollment increased and sparked a demand for more classes, two public health faculty (PHF) mapped out the original four offerings scheduled annually or biennially. PHF shifted the biennial courses to annual offerings and then designed three additional courses to complete the pathway. Each course focused on core objectives with corresponding experiential learning activities. **Table 1** lists the seven courses that students can enroll in as a part of the health science degree.

PHF regularly re-examine course objectives, discuss what worked and did not work, and adjust content based on our observations and student feedback. After 2-years, PHF took a step back and reviewed pedagogical approaches that supported student success vs. approaches that inadvertently caused a disconnect with students. For example, in the introduction to public health course, groups could choose any public health topic for the evidence-based final project. Students struggled with such broad topics, for example, obesity, and completing specific questions to create a public health intervention. Next, we utilized the American College Health Association website for topic selection with resources, but it was a stretch to extrapolate critical information to complete assessments. We combined our student-led in-class book club using Mountains Beyond Mountains by Tracy Kidder as the focus of the final project. Students interacted with the book for multiple purposes including the identification of medical and public health themes during structured in-class activities within their book club assigned groups. The consistency of engaged activities interwoven throughout the term fostered engagement within these themes allowing students to complete a succinct evidence-based project. PHF mapped curriculum meeting CEPH undergraduate competencies, removed duplicate content across the curricula, and determined integrative building blocks to reinforce public health theory and application. PHF discovered the following main themes:

TABLE 1 | List of undergraduate public health courses by level.

Introduction to public health (2,000-level)
Environmental health and justice (3,000-level)
Social determinants of health and health inequities (3,000-level)
Public health program immersion-(3,000-level)
Health policy and systems (3,000-level)
Introduction to epidemiology (4,000-level)
Public health research immersion-(4,000-level)

- A comprehensive approach across and between the curriculum focusing on undergraduate research skills and/or studies expands student knowledge while mastering high level cognitive skills.
- Students excel with engaged public health activities at the individual level that can be scaled up to the bigger picture or institutional level topics.
- A flipped classroom design increases in-class time for active learning with the expectation of preparing for the in-class-time with online materials that are passive (but still engaged) learning.
- Students appreciate variety in course learning modalities and pacing across the undergraduate public health curriculum such as visual, auditory, reading/writing, and kinesthetic activities.
- Curriculum design can incorporate graduate level topics or concepts that tend to focus on breadth instead of depth assuming undergraduate students have mastered basic study skills.
- Students, through self-discovery, find their passion and career path through experiential learning with additional research opportunities outside the classroom in public health, social science, senior capstone experience, and directed studies.

Integrative building blocks across the public health curricula were redesigned based on an extensive literature review of undergraduate, health science, and public health pedagogy. For example, an undergraduate introduction to public health course implemented active learning experiences such as water sampling, a health behavior social media campaign, and rural access to

health care plan (13). These activities were explicitly tied to course objectives (13) and provided PHF informative examples for our curricula development. A study about the European Public Health Bachelor's Program, outlined three semesters of public health courses meeting undergraduate learning objectives (14). A key program component involved a research proposal and an undergraduate senior thesis course (14). These studies helped us formulate our strategy of redesigning public health courses with undergraduate learning best practices based on Bloom's Taxonomy of Hierarchical Category Definitions and Action Verbs (BTHC), the flipped classroom, integrated undergraduate research study skills, and Kolb's Cycle of Experiential Learning (Kolb's Cycle).

Bloom's publication, the Taxonomy of Educational Objectives: The Classification of Educational Goals, is the basis of the foundational theory of cognitive skills in teaching and learning for over a half century (15). Bloom's Taxonomy created a hierarchical structure based on six levels from lowest to high levels of learning: knowledge, comprehension, application, analysis, synthesis, and evaluation (15). In 2005, this framework was revised with learning, teaching, and assessing educational objectives to include: remember, understand, apply, analyze, evaluate, and create (16). The updated Bloom's Taxonomy of Hierarchical Category Definitions and Action Verbs (BTHC) studies show that the hierarchical progression from remembering to creating supports mastery of a skill or knowledge in health care (16–19). The BTHC framework moves from the lowest level of recollection of knowledge to the highest levels of cognitive ability and is effective with public health course objectives based on these levels that correspond to our research related assessments (17). PHF discovered that a complementary pedagogical approach to BTHC is the incorporation of a flipped classroom model which increases time for procedural and metacognitive activities.

The flipped classroom is a well-studied model that supports engaged, student-centered learning that improves critical thinking and problem-solving skills (17). The flipped classroom is based upon student learning outside the classroom to prepare for in-class engaged activities focusing on problem solving, collaborative group work and working with real-world issues (20). A flipped classroom which includes lectures, videos, readings, and other passive online learning techniques are lower on the hierarchy and is then complemented with high level cognitive activities in the classroom (17). With the seven public health courses redesigned with BTHC hierarchical learning objectives, and flipped classrooms, PHF determined that each course should include research skills or student-led research studies across the curricula.

Studies show that undergraduate research is considered a high-impact educational practice and an active learning tool which is conducive to exploring complex public health issues in the classroom (21–25). Soft skills are also obtained with the ability to navigate difficult situations, increase critical thinking, and creatively solve problems (26). The research process allows students to become more resilient with the ability to overcome challenges without necessarily focusing on earning a high grade (26). Integrating undergraduate research into the curricula is mostly based on motivation at the individual faculty level (27) and is highly effective with a student-centered learning approach (28).

A PUBLIC HEALTH CURRICULUM CENTERED ON STUDENT ENGAGEMENT

Learning Environment

UMR is the newest campus within the University of Minnesota state-wide system that recruits and retains underrepresented students using high-impact learning practices. Our mission is to inspire transformation in higher education through innovations that empower our graduates to solve the grand health challenges. UMR offers two undergraduate degree programs-a Bachelor of Science in Health Sciences (BSHS) and a Bachelor of Science in the Health Professions (BSHP). The BSHP is offered in partnership with Mayo Clinic School of Health Sciences. Within the BSHS program, administration has created informal "career pathways" to help students navigate the wide range of careers in the field of health sciences. This is aligned with an overall institutional strategy to recruit and retain students, engage with alumni, and identify potential community partners.

UMR is a small but growing campus with approximately 1,000 students. The long-term strategic plan includes a 250% enrollment increase within the next 10 years. Currently, 40% of the student population identifies as Black, Indigenous, People of Color (BIPOC) and/or 65% as under-represented (first generation, Pell grant recipients), with 92% of students receiving some type of financial aid. Ninety-eight percentage of the 2020 graduating class completed their degree in four years or less, and the overall graduation rate is 65%. To earn a BSHS, students must complete 120 credit hours and have the unique opportunity to earn course credits at sister campuses during their senior year capstone experience.

Our public health series is grouped into the UMR public policy and global health career pathway. Due to the unique structure of our university, undergraduate minors (e.g., public health) cannot be housed within the two-degree programs. Instead, partnerships are created with the University of Minnesota Twin Cities (UMTC) because they have established programs. For example, student credits earned within the seven course public health series offered at UMR are transferable to the UMTC public health minor or can be included in the 4+1 Master of Public Health degree with UMTC School of Public Health. At this time, there is no official data about students who earned 21-credit hours in the public health pathway at graduation; however, there are discussions on gathering information to learn more about student post-undergraduate progress.

Over the past 2 years, freshmen and sophomore students are now required to take the mandatory introduction to public health course, which is a prerequisite for all the upper-level offerings. Currently, maximum enrollment with the intro course is 30 students per section for both the asynchronous online and on-ground classes. Before redesigning the public health seven-course pathway, upper-level courses had < 10 students per class. With the integrated curricula, enrollment is now 10–24 students

per section with the goal of offering multiple sections in response to anticipated growth. Since the pathway is only a suggestion, students can opt to take one or more public health courses during their undergraduate career. Therefore, enrollment can be as low as five students or as high as 28 students in a class. To adjust, the flipped classroom is designed to accommodate any number of students and then engaged activities are designed to scale-up (small groups) or scale-down (individual). With large sections (60 or more students), small groups include an added peer-review component with discussions. In addition to team teaching, PHF can hire undergraduate administrative assistants (the equivalent of a graduate teaching assistant), to assist during a class.

Faculty are organized within an interdisciplinary learning center with a committee governance structure instead of a traditional department and faculty senate. Faculty in the learning center represent the physical, biological, and social sciences, math, humanities, and communication and are encouraged to guest lecture or collaborate across the disciplines. Team taught courses both within and between disciplines are offered regularly. UMRs' primary research focuses on the scholarship of teaching and learning (SoTL), while our disciplinary research investigates health inequities and environmental injustices in urban and rural communities. When proposing a new course, the modality is considered and approved by a curriculum committee that expects pedagogical justification for a blended online/in-class approach. The administration also supports increasing flexibility with student course schedules, and this blended approach requires blocking out only one class period per week instead of two. Informal and formal student assessments provide essential evidence for continual iterations of the curricula.

Pedagogical Frameworks

PHF evaluated assessments and outcomes in relation to course objectives and redesigned them with the BTHC framework. It provided context on how students moved through the curricula taking into consideration the skill levels from lower-level courses to upper-level courses with realistic expectations of undergraduate students' abilities. With a flipped course, students completed passive online learning tasks in preparation for the in-class session. These tasks include observational and brainstorming activities, quizzes, multimedia lectures and assignments integrated into the learning management system or other education technology, such as Yellowdig, Flipgrid, or Softchalk. Online metrics evaluate student progress outside the classroom and alerts PHF to possible concepts that need to be addressed with in-class activities or with slowing down the pace of the course.

Table 2 organizes the in-class active learning BTHC action verbs that drive the scope of the activities throughout the semester.

A scaled-down concern is the adoption of discipline-based textbooks that are often used in both graduate and undergraduate courses. Relying on the structure of the textbook unintentionally moved students quickly through topics and concepts with an emphasis on breadth over depth. We discovered that breadth, most of the time, relied on passive learning activities (terminology, theory and concepts) to effectively cover the expansive weekly topics. From our experience during course delivery, one-on-one and group tutoring sessions, student emails, and student coursework, undergraduate students tend to search for an exact answer and struggle with drawing conclusions from a body of information. Concentrating on depth, instead of breadth, gives students an opportunity to spend more time on the specific topic with engaged materials, asking questions, and becoming more confident with problem-solving.

TABLE 2 | Public health course with Bloom's Taxonomy revised categorical definition and action verbs.

Course	Bloom's definition	Course objective action verbs
Introduction to public health	Applying	Identify, Apply, Organize, Select, Solve
Environmental health and justice	Analyzing	Theme, Relationships, Motive, Examine, Discover
Introduction to epidemiology	Analyzing	Analyze, Conclusion, Relationships, Categorize, Test for
Public health program immersion	Evaluating	Assess, Determine, Evaluate, Importance, Support, Rule on
Health policy and systems	Creating	Build, Change, Adapt, Construct, Formulate, Propose
Social determinants of health	Creating	Theory, Solve, Suppose, Discuss, Elaborate, Choose, Plan
Public health research immersion	Creating	Adapt, Build, Compile, Construct, Design, Test, Improve

PHF discovered that individual level activities were instrumental in engaging and connecting students with public health concepts deeply before asking students to scale up to complex world problems and concept application. Utilizing Kolb's Cycle, each in-class session includes at least one experiential learning activity with a reflective component. The last step to our redesign is based on Kolb's Cycle. **Figure 1** shows the four-stage conceptual model to design student-centric engaged activities involving concrete experience, reflective observation, abstract conceptualization, and active experimentation (29). Kolb's Cycle is based on the concept that knowledge is dependent on the transformation of experience, reflection on these experiences, and relating them back to theory to make decisions and solve problems (30). Studies show that student participation in "real-life" public health applications, including health promotion campaigns, connects students better with theory (31, 32).

For example, in the environmental health and justice course, students' blind taste a meal comparing a fast-food meat-based burger and the equivalent plant-based burger with a small glass of cow's milk, soy milk, and almond milk. It is important to note that a survey was given to students prior to this activity to tailor the menu for individual students due to possible allergies, food preferences, or religious practices, to name a few. After finishing their meal, students voted on burger #1 or #2, or beverage A, B, or C based on taste and personal preference. The results are always unexpected, and students are surprised by the outcomes. Students are then placed into five different groups and are assigned one of the menu items to investigate nutritional

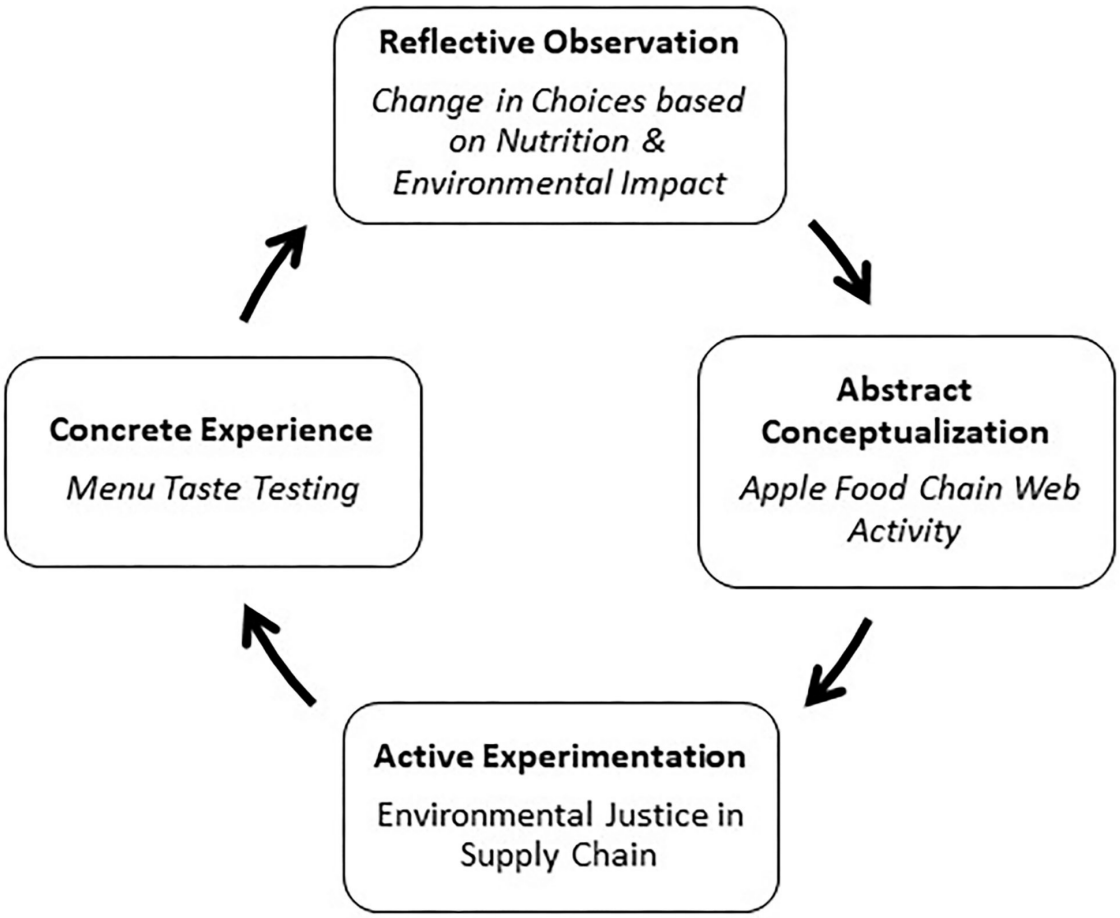

FIGURE 1 | Kolb's Cycle of Experiential Learning to create in-class activities.

value and environmental impact. Each group writes their findings on the board to share with the class. The major takeaways are the two burgers only differ by 30 calories (yet have dramatically different environmental impacts), and environmental impacts of cow's milk and almond milk are much greater than soy milk (with similar nutrients). Students are asked to write a reflection on their initial choices and if they would make any changes based on the new information.

Moving onto abstract conceptualization, students engage in an apple food chain activity. Each student is given a card with a role, and they stand up to form a circle. A random student is given a ball of string and is asked to look at the other role cards to determine which one would be next in the chain. There is no right, or wrong answer and students can visually see a complex web associated with growing and eating a simple apple. With active experimentation, an apple food supply chain image is projected onto a screen (in our situation, the classroom has a projector with three screens). Students are given post-it notes and are asked to identify possible environmental justice issues that can take place along the supply chain such as farmers and laborers exposed to pesticides.

Learning Objectives

In **Table 3**, each public health course has a research competency, an outcome objective, leadership role and unique type of course research skill(s) or product. Classes with a faculty research leader begin with individual level activities and then move onto group-based work. This provides a stepwise approach to critical thinking and problem solving before introducing group social dynamics. Student project leaders work within research groups on collaborative research activities in a supervised classroom. This allows PHF to engage with groups to answer questions, navigate research obstacles, and keep the groups on task. The positive experience of implementing an empowering classroom research study, especially a study in which students investigated a problem that directly impacted them, cannot be understated.

COLLECTING, ANALYZING, AND EVALUATING COURSES AND ASSESSMENTS

Data collected in public health courses, including student assessments, reflections, surveys or any deliverable produced

TABLE 3 | Public health course research strategy.

Course	Type of assessment	Research leader	Content	Outcome
Introduction to public health	Individual	Instructor	Evidence-based public health	Identify problem, etiology, recommendation, interventions and evaluation (PERIE Process). Utilize CDC best practices
Environmental health and justice	Group	Instructor	Health behavior model, experiments, annotating book chapters	Practice annotation research skills, collaboration, and community-based learning
Introduction to epidemiology	Individual	Instructor	Evidence based public health, case studies, analyzing disease surveillance data	Strengthen quantitative skills in descriptive statistics, public health policy, and disease surveillance
Public health program immersion	Group/ Individual	Student	Public health program evaluation research	Create and implement a public health program with high school mentees within an outdoor field experience
Health policy and systems	Group	Student	Qualitative research on university level policy	Design qualitative research study with photovoice, interviews, coding, themes, and findings
Social determinants of health	Individual	Instructor	Literature review and applying theory of change and logic model to public health research	Interpret peer reviewed literature, design a project proposal, incorporate Theory of Change and Logic Model into program processes
Public health research immersion	Group/ Individual	Student	Mixed methods research	Design and implement a research study based on an outdoor field experience

during the semester are included in an institutional IRB for SoTL research. PHF creates materials for qualitative research initiatives looking at student study skills such as close reading and annotating, student engagement with their peers, and student critical thinking skills with complex issues. Below are some examples of our current data collection.

Although not always an optimal resource for evaluation, we track student rating of teaching scores (SRTs) and corresponding comments. Overall, public health course SRTs have increased to include only positive affirmations of agree and strongly agree in each category. In addition, the feedback provides student insights of their learning experiences and course criticisms such as:

- "Taught me a lot about qualitative research and showed me how to be creative in my research".
- "She challenged us to look at concepts from different viewpoints".
- "I would like to have done more interviews with students for our research project".
- "I would like more time working with my group in class".

PHF integrates constructive criticism such as simplifying research steps (expecting them to complete too much on their own), modifying the data collection to balance student needs with feasibility, or restructuring in-class time to support more group work.

Across the seven-course public health curriculum, at least one assessment includes close reading skills and annotating text. For example, in the immersion classes, students borrow their textbooks from the class resource pool and are given four different colored sticky notes. Each sticky note represents a theme (i.e., public health or individual connection) for students to annotate within the book. Students return their textbooks with the sticky notes. PHF code and analyze student engagement with the materials, depth of knowledge, and thematic interests using students' annotations. In another instance, the students read chapters embedded into the Hypothes.is app. Students can highlight, annotate, and comment on each other's annotations to collaborate on a group worksheet in Google Docs. With the suggested editing tool on, faculty can see the individual contributions to the worksheet. Both documents are analyzed using a qualitative time/space software which tracks how students interact with each other.

We are collecting longitudinal data examining student engagement with Yellowdig, a community building platform, that includes a variety of learning tools students use to earn points toward a weekly goal. This design encourages student interactions with little influence from instructors who monitor the metrics behind the scenes. The conversations are deidentified and then analyzed for themes within and between cohorts to determine their engagement with both individual level and big picture public health problems.

Other types of data collection include focus groups, pre and post surveys, semester journals, or handwritten weekly reflections. Assessments associated with active learning such as group white board work or venturing out into the community are photographed to capture the experiences. The objective is to holistically view all activities to determine if there are different components that might evolve into a SoTL study–and to evaluate student engagement across the curricula.

AN UNEXPECTED UNDERGRADUATE RESEARCH EVOLUTION

The integrated public health curricula has piqued student research interests outside the classroom. Students ask to participate in public health research through institutional undergraduate research stipends, applying for undergraduate research assistantships or earning directed study credits. Students can also request a research mentor in other disciplines to

pursue their own research initiatives. To support undergraduate researchers' efforts, it takes more time to prepare, engage, and complete research tasks as undergraduate students gain confidence with their research skills while applying them in "a real-life setting."

The research trajectory of three students, D, C, & H that completed public health course(s) exemplify potential long-term implications for supporting undergraduate student opportunities outside the classroom. D wanted to learn more about reproductive health and completed a directed study with Dr. Osiecki and Dr. Barnett. D was interested in a transnational phenomenon while also exploring more specialized qualitative approaches (such as grounded theory, ethnography, or narrative analysis.) and was introduced to Dr. Mejia, sociology faculty. D started working on Dr. Mejia's ongoing research project examining reproductive health attitudes of undergraduate students. D organized and collected texts and interviews into a qualitative data set while learning Atlas.Ti software. By the third week of the term, D was ready to work with Dr. Mejia on the basics of grounded theory analysis. Dr. Mejia then hired D as an undergraduate research assistant to facilitate focus groups and collect in-depth interviews for her project on COVID-19 perspectives of Women of Color on campus.

C expressed interest in learning more about community-based participatory research (CBPR) methods. C spent 1 year working with Dr. Osiecki on an environmental justice study. C then collaborated with Dr. Mejia and a community partner, the Village Community Garden and Learning Center, to collect data (focus groups with BIPOC refugee farmers of SE Asian descent) and train other volunteers on research tasks. Dr. Mejia then hired C as an undergraduate research coordinator for a project on women and STEM in mental health. (Now an alumna, C is a member of the board of directors of the above-referenced community partner).

H spent 2 years with Dr. Osiecki and Dr. Barnett outside the classroom as an undergraduate assistant supporting the public health immersion courses including finding and writing grants for the field experiences. In her senior year, H signed up for directed study hours with Dr. Mejia to develop a funding strategy to help a small agricultural cooperative. H, was able to apply her previous public health skills to write several small grant proposals while actively participating with the agricultural cooperative. Out of three proposals written by the student, one was given comments by the grantor with an invitation to re-apply, and another one was fully funded with an invitation to submit to another grant call for applications. The fully funded proposal allowed for the small agricultural cooperative to receive funds and in-kind donations of building materials. The cooperative was able to set up a system of pest control barriers for the growers while also providing funds to develop a week-long summer program for K-12 students to learn about human consumption patterns.

D and Dr. Mejia wrote a chapter on reproductive health in the classroom and submitted it to a call for papers for an edited volume on the health humanities. (As of writing this article, the chapter has been accepted with minor revisions). C co-authored a collaborative autoethnography (as a second author) with Dr. Mejia as a corresponding author on COVID-19 and health science undergraduates' emotional health. Student D and C, along with the third author, submitted another paper looking at care work and caregiving inequities along intersectional lines and COVID-19. As of this date, the paper has received a revise and resubmit with minor changes.

Students D, C, and H, treated as research collaborators, instead of task masters, show high levels of work while gaining confidence in their abilities. A crucial component to this unexpected success is the informal conversations between PHF and their sociologist colleague. Sharing of ideas, teaching methods, and best practices started as invitations to guest lecture in each other's classes and evolved into a larger undergraduate student research initiative. Currently, Dr. Osiecki and Dr. Mejia are working together on campus food insecurity with undergraduate research assistants. Dr. Osiecki, Dr. Barnett and Dr. Mejia are also writing a student mentorship article, and we are brainstorming possible research opportunities with biology and fine arts faculty. It is the shared undergraduate student research experiences that brought us all together.

REALITIES INCORPORATING UNDERGRADUATE RESEARCH INTO PUBLIC HEALTH CURRICULA

The biggest challenge of implementing an integrated research curriculum is time. Incorporating research skills and student-led research projects requires PHF planning to manage student time in and outside the classroom. Research skill courses require a slower pace with easy-to-follow instructions in the flipped classroom environment. Research study courses need flexibility and adaptability when students change directions, as well as realistic expectations for research with regards to limitations presented by a semester's finite length. There are additional demands of meeting with students outside the classroom during office hours or by appointment. The outcomes support the additional time, and with continual course offerings and iterations, PHF becomes more efficient the instruction.

Planning to facilitate student research is different from planning research for students. PHF relies on looser constructs to readjust in-class activities due to the increased uncertainty involved with undergraduate student research needs. To prepare for these readjustments, activities are planned for the overall assessment and not for a particular class session. Predicting length of engagement within a particular task is difficult with some activities going faster or slower than expected. We also over plan with the ability to change directions based on student engagement levels. Depending on the time of day or week within a semester, students can exhibit high or low energy and pushing students is not necessarily the answer. Also, when students show commitment and connections with an activity that is above and beyond expectations, PHF may adjust the schedule to enable sustained engagement.

Lastly, team teaching is hard to do. It is not a division of responsibilities or rotating materials but instead learning how to complement each other in the classroom. Navigating group work

and discussions requires a rhythm, PHF banter off each other and share complementary expertise, and it is a key to understanding body language and moving around the class. Both parties need to be dedicated to the model and continue working together on curriculum outside the classroom to be on the same page.

IT'S ALL ABOUT WHAT WORKS FOR YOU

This integrated public health curricula works for us because of unique institutional qualities that support PHF team teaching, smaller classroom sizes, and SoTL faculty research agendas. We acknowledge that academia looks different depending on the size of the institution, college, and department with different expectations of teaching, research, and service. Active learning, undergraduate research, and integrating public health curricula is not an all or nothing endeavor. Within an individual course, choose an objective with a higher-level outcome to pair with an in-class engaged activity. In large lecture halls, students can pair up, turn to the row behind them, or even move into the hallway. In a classroom, encourage students to move around desks or work on chalk/white boards.

If collaborating or team teaching is appealing, find a colleague within or outside the department, who would be interested in guest lecturing with you. The planning time commitment is low with potential high rewards. For example, PHF guest lectures with colleagues in other disciplines to create activities on topics such as food insecurity or realities of being a low-wage earner. It is an opportunity to watch and learn from each other within different contexts. Collaborating between two or more classes, can also be a synergistic fit, for example, introducing intersectionality in a sociology course and then examining population characteristic and social determinants of health within the praxis of intersectionality. The goal is to support learning that benefits both faculty and students.

Lastly, undergraduate research within courses is a high impact practice with a lot of flexibility to meet course objectives. The type of research or skill, how students engage with each other, the duration of the project, and instructor facilitated activities, to name a few, can be designed to be engaged activities, assessments, or both. It is also an opportunity to bring inspiring faculty research into the classroom to expose students to discipline-based public health studies that take place outside the classroom. Public health curricula lend itself to higher level learning approaches and PHF embraced theories and models that worked best for them.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

KO and JB contributed to conception and design of the curriculum, pedagogical research, and data collection. AM and KO contributed to undergraduate research theory and application. KO, JB, and AM collaborated and wrote sections of the manuscript. All authors contributed to manuscript revision, read, and approved the submitted version.

REFERENCES

1. DeSalvo K, Parekh A, Hoagland GW, Dilley A, Kaiman S, Hines M, et al. Developing a financing system to support public health infrastructure. *Am J Public Health.* (2019)10:1358–61. doi: 10.2105/AJPH.2019.305214
2. Bekemeier B, Marlowe J, Squires LS, Tebaldi J, Park S. Perceived need versus current spending: gaps in providing foundational public health services in communities. *J Public Health Manag Pract.* (2018) 24:271–80. doi: 10.1097/PHH.0000000000000612
3. Evashwick CJ, Tao D, Arnold LD. The peer-reviewed literature on undergraduate education for public health in the United States, 2004-2014. *Front Public Health.* (2014) 2:223. doi: 10.3389/fpubh.2014.00223
4. Tulenko K, Vervoort D. Cracks in the system: the effects of the coronavirus pandemic on public health systems. *Am Rev Public Adm.* (2020) 6–7:455–66. doi: 10.1177/0275074020941667
5. Recommended critical component elements of an... [Internet]. Association of Schools and Programs of Public Health (2012). Available online at: https://aspph-wp-production.s3.us-east-1.amazonaws.com/app/uploads/2014/04/CCE_2012-08-03-FINAL.pdf (accessed January 26, 2022).
6. Resnick B, Leider J, Riegelman R. The landscape of US undergraduate public health education. *Public Health Rep*. (2018) 133:619–28. doi: 10.1177/0033354918784911
7. Wykoff R, Petersen D, Weist EM. The recommended critical component elements of an undergraduate major in public health. *Public Health Rep.* (2013) 128:421–4. doi: 10.1177/003335491312800516
8. Mowry D, Abels P. An approach to development of a public health minor. *Peer Rev.* (2009) 11:23.
9. Institute of Medicine. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*. Washington, DC: National Academies Press (2002). p. 31.
10. Godfrey S, Nickerson K, Amiel J, Lebwohl B. Development of an online public health curriculum for medical students: the public health commute. *BMC Med Educ.* (2019) 19:298. doi: 10.1186/s12909-019-1734-4
11. Berwick DM, Finkelstein JA. Preparing medical students for the continual improvement of health and health care: Abraham Flexner and the new "public interest". *Acad Med.* (2010) 85:S56–65. doi: 10.1097/ACM.0b013e3181ead779
12. Haq C, Stearns M, Brill J, Crouse B, Foertsch J, Knox K, et al. Training in urban medicine and public health. *Acad Med.* (2013) 88:352–63. doi: 10.1097/ACM.0b013e3182811a75
13. Yeatts K. Active learning by design: an undergraduate introductory public health course. *Front Public Health.* (2014) 2:284. doi: 10.3389/fpubh.2014.00284
14. Kuiper T, Meijer A, Moust J. Innovation in public health teaching: the maastricht experience. *Public Health Rev.* (2011) 33:300–14. doi: 10.1007/BF03391635
15. Bloom BS. *Taxonomy of educational objectives: the classification of educational goals*. New York, NY: Longmans, Green (1956).
16. Anderson LW, Krathwohl DR. *A Taxonomy For Learning, Teaching, and Assessing: a Revision of Bloom's Taxonomy of Educational Objectives*. New York, NY: Longmans (2001).
17. Morton DA, Colbert-Getz JM. Measuring the impact of the flipped anatomy classroom: The importance of categorizing an assessment by Bloom's taxonomy. *Anat Sci Educ.* (2017) 10:170–5. doi: 10.1002/ase.1635

18. Mashamba-Thompson TP, Sartorius B, Stevens FC, Drain PK. Experiential Bloom's Taxonomy learning framework for point-of-care diagnostics training of primary healthcare workers. *Afr J Lab Med*. (2016) 5:1–4. doi: 10.4102/ajlm.v5i1.449
19. Sharunova A, Butt M, Qureshi AJ. Transdisciplinary design education for engineering undergraduates: mapping of bloom's taxonomy cognitive domain across design stages. *Procedia CIRP*. (2018) 70:313–8. doi: 10.1016/j.procir.2018.02.042
20. Hawks SJ. The flipped classroom: now or never? *AANA J*. (2014) 82:264–9.
21. Beckman M, Hensel N. Making explicit the implicit: Defining undergraduate research. *CUR Quarterly*. (2009) 4:40–4.
22. Laursen S, Hunter AB, Seymour E, Thiry H, Melton G. *Undergraduate research in the sciences: Engaging students in real science*. New York: Jossey-Bass (2010).
23. Levy P, Petrulis R. How do first-year university students experience inquiry and research, and what are the implications for the practice of inquiry-based learning? *Stud High Educ*. (2012) 37:85–101. doi: 10.1080/03075079.2010.499166
24. Lopatto D. *Science in Solution: The Impact of Undergraduate Research on Student Learning*. Tucson: Research Corporation for Science Advancement (2009).
25. Steinberg SR, Kincheloe JL. *Students as Researchers: Creating Classrooms that Matter*. London: Routledge Falmer (1998).
26. Wolf SL. Undergraduate Research as Engaged Student Learning. *New Directions for Teaching and Learning*. (2018) n154:75–85. doi: 10.1002/tl.20293
27. Griffiths R. Knowledge production and the research-teaching nexus: The case of the built environment disciplines. *Stud High Educ*. (2004) 29:709–26. doi: 10.1080/0307507042000287212
28. Kember D. A reconceptualisation of the research into university academics' conceptions of teaching. *Learning Instr*. (1997) 7:255–75. doi: 10.1016/S0959-4752(96)00028-X
29. Hartley MP. Experiential learning using Kolb's cycle of learning. *J Nurs Educ*. (2010) 49:120. doi: 10.3928/01484834-20100119-02
30. Arbuthnot E, Hansen-Ketchum P, Jewers H, Moseley J, Wilson C. Bringing theory to life: Engaging nursing students in a collaborative population-based screening project. *Int J Nurs Educ Scholarsh*. (2007) 4:Article3. doi: 10.2202/1548-923X.1358
31. Gabbay John. Courses of action—the case for experiential learning programmes in public health. *Public Health*. (1991) 105:39–50. doi: 10.1016/S0033-3506(05)80315-4
32. Roman V. Experiential learning in undergraduate education–doing and reflecting. *Am J Med Sci*. (2018) 356:88. doi: 10.1016/j.amjms.2018.06.001

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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BRIEF RESEARCH REPORT
published: 28 April 2022
doi: 10.3389/fpubh.2022.771844

The Impacts of the COVID-19 Pandemic on Service-Learning Experiences Among Undergraduate Public Health Students in Hawai'i

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Service-learning is a high-impact educational practice at the core of the undergraduate public health degree at the University of Hawai'i at Mānoa (UHM). This practice provides an invaluable learning experience and professional opportunity for students to collaborate with community partners and make significant contributions in the field. The COVID-19 pandemic halted or disrupted service-learning experiences as community partners adapted to shifting mandates and emergency orders. Surveying the rapidly evolving landscape of partner organizations to support service-learning is a challenge. Assessing changes to the program mentorship or satisfaction is the first step to developing protocols to ensure standardization of service-learning during times of crisis. This study will address if and how the pandemic impacted students' satisfaction with required service-learning experiences. Furthermore, authors hope to create a comprehensive list of practicum partnering organizations, both focused on pandemic response and, more generally, of the service-learning students at UHM, with the intent to increase students and community partners in local service-learning. Assessments were conducted to assess the impact of COVID-19 on undergraduate students' experiences with service-learning through use of a program exit survey. The authors hypothesized pandemic-related adjustments would not affect student satisfaction or skill development. Despite challenges associated with the pandemic and emergency online transitions, students persisted in personal and professional growth associated with service-learning. This developed resilience supports students as they graduate and enter a workforce adapting to remote work demands and community needs.

Keywords: service-learning, undergraduate studies, public health, COVID-19, bachelor's degree, high-impact educational practices, BAPH, BSPH

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Edited by:
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Reviewed by:
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Specialty section:
This article was submitted to Public Health Education and Promotion, a section of the journal Frontiers in Public Health

Received: *07 September 2021*
Accepted: *29 March 2022*
Published: *28 April 2022*

Citation:
Kehl L, Patil U, Tagorda M and Nelson-Hurwitz DC (2022) The Impacts of the COVID-19 Pandemic on Service-Learning Experiences Among Undergraduate Public Health Students in Hawai'i. Front. Public Health 10:771844. doi: 10.3389/fpubh.2022.771844

INTRODUCTION

The establishment of undergraduate programs in public health has been a recent development nationwide (1). Service-learning is a key component of these programs. Service-learning is a type of experiential learning that involves students providing a service to a community organization and the organization providing a learning experience for the student. The Health Professions Schools in Service to the Nation (HPSISN) program defines service-learning as "a structured learning

experience that combines community service with explicit objectives, preparation, and reflection" (2). It is an academic activity in which students are applying skills learned in the classroom in the community (2). As a key tenet of undergraduate education, service-learning is 1 of 11 common high-impact educational practices (3).

The COVID-19 pandemic upended the education experience across the globe (4–8). Many states, including Hawai'i, issued emergency stay-at-home orders, closing down non-essential businesses and schools, including universities (9, 10). On March 12, 2020, the University of Hawai'i notified all 10 campuses that classes would move online for 2 weeks following spring break (11, 12). By the time classes resumed following spring break, in-person classes had been moved online for the remainder of the semester and the entire state was under a stay-at-home order. Educational programs were required to pivot their service-learning programs in response to the pandemic.

Pandemic Impacts on Service Learning

The COVID-19 pandemic and associated mandates and regulations disrupted student service-learning experiences (6, 8, 13). Community organizations are, and continue to be, challenged by evolving requirements and emergency orders, leading to variable responses to student engagement requests. Meanwhile, students have limited service-learning options, and educational program responses need to be increasingly adaptive. Effective experiential learning programs are often faced with rapidly evolving situations and circumstances that impact students and partner organizations.

Many pandemic-related restrictions were put into place by government officials in the State of Hawai'i (10, 14). Following strict public health guidance, limitations to in-person activities unpredictably affected community organizations that provide direct service to communities, especially where demand for such services is highly variable. Moreover, many organizations were projected to lose funding or other resources, reducing capacities to work with, and regularly mentor students.

The pandemic had immediate impacts on every organization—some were able to adapt quickly and continue providing services remotely, some were not able to pivot to remote services and instead reduced what they could offer clients, while some found their clients had new needs and designed new approaches to fill those needs (e.g., distributing food), and others still had financial issues and were forced to lay off the majority of their staffs. All of these scenarios had different effects on students and their service-learning activities.

Applied Learning Experience

The Applied Learning Experience (APLE) is a capstone service-learning program requirement within the Bachelor of Arts in Public Health (BAPH) degree at the University of Hawai'i at Mānoa (15). It is implemented through a three-course capstone series. During the APLE students conduct 100–120 h of service-learning with a community organization, typically completed over a semester or summer.

The conceptual frameworks on which the APLE is built atop consist of three major components: the Council on Education for Public Health (CEPH) competencies for undergraduate degree programs (16), the 10 Essential Public Health Services (EPHS) (17), and the landmark service-learning model developed by Yoder (18, 19).

By accrediting schools and programs of public health, not only do CEPH domains and competencies guide bachelors in public health learner outcomes, but also require a culminating experience to prove students are able to translate their new knowledge into effective work with community partners. As such, the required embedded service-learning opportunity offered to students also serves the ultimate goals of the program. But as Mackenzie et al. (20) report in a 2019 summary of a bachelor's-level service-learning experience, CEPH falls short in dictating how programs should meet those goals, and the group acknowledges that student learning builds upon itself in esoteric ways.

The EPHS, most recently revised in 2020 by Public Health National Center for Innovations (PHNCI) and the de Beaumont Foundation, summarizes the work of public health practitioners, researchers, and instructors into 10 fields, of which form three main categories: assurance, policy development, and assessment (17). This omnipresent framework directs practicum placements to clearly identify their potential services as one of the established public health services. Having unambiguous positions allows for the student and administrator to understand their value to the field (and report such to CEPH).

Under the Yoder model, four aspects to consider when developing service-learning opportunities include growth, scholarship, programs, and partnerships (18). The developed APLE articulates clearly with this model. For example, within scholarship, an academic link in APLE is that the service-learning is directly tied to an academic course, PH 485: Public Health Applied Learning Experience, and academic preparation for field experience in PH 480: Applications of Public Health in Research and Practice. While students are engaged in service-learning experiences, they are also supported and supervised by the Field Education Coordinator, a faculty position. The APLE program additionally has sustained community partnerships (a Yoder model component within the partnerships aspect) (19), with multiple non-profit organizations, government agencies, and university faculty that have been cultivated and sustained over time. Community partners will frequently collaborate with multiple students over time, in sequential semesters, demonstrating sustained partnership between the University and individual organizations.

Process

The APLE process starts first with a preparatory course, PH 480: Application of Public Health Principles in Research & Practice. In this course, usually taken the semester prior to PH 485, students conduct a literature review on an individually selected public health topic of interest and organizations involved in this topic. In the subsequent course, PH 485, a service-learning experience of 100–120 h is required. Students typically complete these hours over a 16-week semester or the summer break, consisting of 12 weeks. Students work with organizations individually to develop a mutually agreeable work schedule.

Throughout the process, and concurrent with the mentored field experience, students engage in writing reflective blogs and in participating in class discussions and check-ins. The third course in the APLE capstone series is PH 489: Public Health Undergraduate Capstone Seminar, where students develop an individual capstone report, which combines their academic preparation (i.e., topic literature review) with field experience gained through service-learning. Students generally take PH 489 in their final semester before graduation.

Pandemic Adjustments

In the spring of 2020, the COVID-19 pandemic began and classes at the University of Hawai'i at Mānoa (UHM) were moved to an online format beginning on March 23, 2020. Service-learning immediately disappeared from most UHM classes that had previously included it as a course component, as in-person interactions were often not allowed under newly developed COVID-19 policies. In some cases, significant modifications were made to service-learning assignments, or they were eliminated altogether. Restrictions at UHM specified students could not be required to attend in-person activities as part of their course work.

At this time, all APLE students and their sites were notified that all activities and service-learning hours would be required to be completed remotely for the remainder of the semester. This brought a multitude of immediate challenges, as students and sites responded in different ways. Some were able to pivot and switch to remote service or collaboration, while others were unable to adapt and ended their mentorship.

As a school of public health in the middle of a public health crisis, many BAPH students felt called to help and rose to the challenges presented by the pandemic. They chose to take advantage of the tremendous opportunities created by the pandemic to apply public health skills in the community. There was no better time for service-learning and many students signed up to help volunteer with the Hawai'i Medical Reserve Corps (MRC) (21) to give back to the community and help those in need.

At the Office of Public Health Studies (OPHS), direction for program development was taken from CEPH (22) regarding how to address students currently conducting service-learning projects as part of the requirements of their academic degree. CEPH provided guidance on their website and encouraged flexibility and creativity in developing solutions and projects for students to engage in: "Maximum flexibility and creative solutions should be applied to students whose experiences are impacted by the current crisis" (22). "CEPH supports flexible approaches at this time and you may temporarily modify your policies to accommodate current circumstances" (22). Using this guidance, minimal adjustments needed to made to the service-learning supervising course aside from communicating evolving University policy changes to the students and maintaining awareness of existing and emerging personal challenges among students.

Study Purpose

During the COVID-19 pandemic, surveying the rapidly evolving landscape of service-learning opportunities and partner organizations has been a challenge. Assessing changes among community organizations of program mentorship and satisfaction is the first step to developing protocols to ensure standardization of service-learning during times of crisis. More generally, there is little known about the challenges faced by this high-impact educational practice during COVID-19, and even less reported on unexpected successes during this transition.

This study will address if and how the pandemic impacted students' satisfaction, skill development, and perceived support to future goals with the Applied Learning Experience. Furthermore, the authors hope to create a comprehensive list of partnering community organizations, both focused on pandemic response and, more generally, of the service-learning students at UHM, with the intent to highlight community partner responses to local service learning during a global pandemic. The authors hope to glean valuable insight into student satisfaction, skill development, and perceived support associated with service learning during this pandemic and implications for service-learning opportunities during future crises, locally and globally.

METHODS

Study Design and Sample

The proposed study examines a cohort of BAPH students focusing on the APLE portion of their academic journey. It will compare students who conducted their APLE during calendar year 2019 to students who conducted their APLE during calendar year 2020. The students in the 2019 cohort will serve as a baseline (Pre-COVID), while the students in the 2020 cohort will serve in one of three comparison groups, depending on which pandemic-related stage the students participated in service learning. These stages include (a) Spring 2020-COVID Interrupted; (b) Summer 2020-COVID Impacted; and (c) Fall 2020-COVID Adapted. While the pandemic continues to evolve and subsequent semesters' of service-learning may also be considered as COVID Adapted, the scope of this study is limited to COVID-19 impacts in 2020.

Measures

The primary data source is the OPHS BAPH Exit Survey (see **Appendix A**), a Google Forms survey that collected data on student satisfaction with the APLE, and ratings of service-learning quality with regard to development and application of public health skills, among other items. This data source was linked to students' names and/or email addresses so that data from different sources can be combined to create a profile for each student.

Service-learning partner organizations that participated during the study timeframe have been listed in **Table 1**. Partner organizations have been identified as locally based and/or nationally based with local affiliation. Also, those agencies with specific COVID-19 pandemic response programs have been noted.

This study was reviewed and approved by the University of Hawai'i at Mānoa. It was deemed to not be human subjects research.

TABLE 1 | Service-learning partner organizations.

Name of organization	Local organizations, specific to Hawai'i	National organizations with local affiliates	COVID-19 response organizations
American Cancer Society-Cancer Action Network Hawai'i-Pacific		X	
American Lung Association in Hawai'i		X	
Blue Zones Project Hawai'i	X		
Department of Health, Medical Reserve Corps Oahu	X		X
Hawai'i Health & Harm Reduction Center	X		X
Hawai'i Public Health Institute	X		X
Healthy Mothers, Healthy Babies	X		X
John A. Burns School of Medicine, Department of Psychiatry	X		
Kalihi Kidz	X		
Kokua Kalihi Valley	X		X
Mental Health America of Hawai'i		X	
Our Kupuna	X		X
Palama Settlement	X		X
Surfrider Foundation Hawai'i		X	
University Health Services Mānoa, Health Promotion	X		
Waianae Coast Comprehensive Health Center	X		X
YMCA of Honolulu		X	

OPHS BAPH Exit Survey

This Google Forms survey was distributed via email from OPHSAS to all students at the end of the semester that they are enrolled in PH 489, typically the semester they graduate. This data has been collected every fall and spring semester since the BAPH program graduated its first students in 2015.

Analysis Plan

Data from the OPHS BAPH Exit Survey were transferred from the Google Forms survey platform to Microsoft Excel. All sources of data were coded into Pre-COVID, COVID Interrupted, COVID Impacted, and COVID Adapted, based on identifying information such as student names and email addresses, and correlated with PH 485 course enrollment data. Analyses of variance were used to evaluate differences among cohorts of students.

TABLE 2 | Sample size and response rates of exit survey data, reported by PH 485 student enrollment semester.

Impact of COVID-19 on service-learning experience	Number of students	Student exit survey data (response rate)
Pre-COVID (baseline/comparison)	38	38 (100%)
COVID interrupted	25	25 (100%)
COVID impacted	18	15 (83.3%)
COVID adapted	19	17 (89.5%)
All	100 students	95 (95.0%)

RESULTS

Table 1 lists service-learning partners, their geographical scope, and any response to the COVID-19 pandemic. In addition to these partners preexisting community organizations were also available for students to complete virtual service-learning experiences. Roughly one to five students were placed with available organizations during any given semester throughout the duration of the study. The multitude of service-learning opportunities attests to the wide community engagement of OPHS and willingness to train BAPH students to assist beneficiaries in the present moment, and to develop into effective staff members later. Service-learning experiences allowed students to practice all 10 essential public health services, helping alleviate issues ranging from poor nutrition to sedentary living to maternal mortality and serious mental illness.

While relatively small, the State of Hawai'i offers many services to the sick, indigent, uninsured, and vulnerable. Hopefully, sharing this list will encourage other academic and professional providers of service-learning opportunities to forge partnerships with these social service agencies or contribute to the list.

Participation and Response Rate

Of 100 students who were invited to participate in the Exit Survey, data were gathered, coded, and analyzed from 95 graduating BAPH students, all of whom graduated between Fall 2019 and Fall 2021. Thirty-eight students graduated in December 2019 and this cohort was used as a Pre-COVID comparison group. Twenty-three of these students conducted their APLE in Spring 2019 and 15 conducted APLE in Summer 2019. Data from each student's service-learning experience was available for analysis. There were 62 students who participated in service-learning experiences either interrupted (25 students), impacted (18 students), or adapted (19 students) to COVID-19, of which 57 responded to the BAPH Exit Survey (response rate: 91.94%; 3 students impacted by COVID and 2 students in COVID adapted had not graduated or had not responded to the BAPH Exit Survey). These data are summarized in **Table 2**.

In the COVID Interrupted group (Spring 2020), all 25 graduating students provided adequate data through the Exit Survey. In the COVID Impacted group (Summer 2020), 15 of 18 (83.3%) students provided adequate data, and in the COVID Adapted group (Fall 2020), 17 of 19 (89.5%) students provided adequate data. In total, responses from 95 students (95.0%) were included in analyses of student satisfaction and service-learning opportunity quality.

Student Satisfaction Outcomes

Table 3 summarizes student satisfaction and opportunity quality of practicum partner organizations. Over the pandemic stages (i.e., Pre-COVID, Interrupted, Impacted, Adapted), analyses fail to find statistically significant differences in perceptions that the APLE prepared students for the future: $F_{(3,96)} = 0.532$, $p = 0.661$; adequate assistance was received in the development and supervision of the APLE: $F_{(3,96)} = 1.026$, $p = 0.385$; the APLE helped develop skills in basic public health concepts: $F_{(3,96)} = 1.589$, $p = 0.197$; and the APLE allowed for demonstration of the application of public health skills: $F_{(3,96)} = 0.324$, $p = 0.808$. That is to say, students' perceptions were not significantly different as APLE experiences changed throughout the pandemic. While minor dips in satisfaction and opportunity quality are present in students engaging in service-learning at the start of the pandemic, these figures rebound as social service agencies adapted to operating during the health crisis. Moreover, these variations are not practically meaningful in a sample of this size.

Most students were highly satisfied with their service-learning opportunities. They rated the APLE with a median score of Excellent, the highest rating, with regard to how well it prepared them for future opportunities. Moreover, a median rating of Excellent was given with regard to the assistance received in the development and supervision of the APLE. The median scores did not differ between groups; that is, no significant differences were found in the satisfaction of APLE experiences before, interrupted by, impacted by, or adapted to the pandemic. Students also acknowledged that their practica allowed them to develop skills in basic public health concepts, with a median rating of Strongly Agree. More than half (55%) strongly agreed with the statement, and 54% strongly agreed that the APLE allowed them to apply public health skills with a median rating of Strongly Agree. These scores did not differ significantly among groups either.

On average, 58% of students responded that the service-learning experience prepared them for their future to an excellent degree, while 65% noted having an excellent level of assistance in the development and supervision of their APLE. In terms of opportunity quality, 55% of students stated they strongly agree that the APLE allowed them to develop skills in basic public health concepts and 54% strongly agreed with the assertion that the service-learning opportunity allowed them to demonstrate the application of public health skills.

DISCUSSION

Service-learning is an invaluable experience for students, which is not diminished by the many challenges imposed by a global pandemic. This high-impact educational practice has shown itself to be both flexible and resilient to continual policy changes and government interventions, including business shut-downs, curfews, and stay-at-home orders.

TABLE 3 | Summary of exit survey data, reported by PH 485 student enrollment semester.

Impact of COVID-19 on service learning experience	1a: How adequate was the Applied Learning Experience (APLE) that you gained here for preparation for your future?*	1b: How adequate was the assistance you received in the development and supervision of the APLE of your program?*	2: My APLE allowed me to develop skills in basic public health concepts**	3: My APLE allowed me to demonstrate the application of my public health skills**
Pre-COVID (baseline/comparison) ($n = 38$)	% Excellent: 65.8% Mean: 4.5 Median: 5.0	% Excellent: 57.9% Mean: 4.4 Median: 5.0	% Strongly Agree: 63.2% Mean: 4.6 Median: 5.0	% Strongly Agree: 55.3% Mean: 4.5 Median: 5.0
COVID interrupted ($n = 25$)	% Excellent: 60.0% Mean: 4.5 Median: 5.0	% Excellent: 72.0% Mean: 4.7 Median: 5.0	% Strongly Agree: 52.0% Mean: 4.5 Median: 5.0	% Strongly Agree: 52.0% Mean: 4.5 Median: 5.0
COVID impacted ($n = 15$)	% Excellent: 44.4% Mean: 4.3 Median: 4.0	% Excellent: 61.1% Mean: 4.6 Median: 5.0	% Strongly Agree: 50.0% Mean: 4.5 Median: 4.5	% Strongly Agree: 61.1% Mean: 4.6 Median: 5.0
COVID adapted ($n = 17$)	% Excellent: 52.6% Mean: 4.4 Median: 5.0	% Excellent: 73.7% Mean: 4.7 Median: 5.0	% Strongly Agree: 47.4% Mean: 4.2 Median: 4.0	% Strongly Agree: 47.4% Mean: 4.4 Median: 4.0
All ($n = 95$)	% Excellent: 58.0% Mean: 4.4 Median: 5.0	% Excellent: 65.0% Mean: 4.6 Median: 5.0	% Strongly Agree: 55.0% Mean: 4.5 Median: 5.0	% Strongly Agree: 54.0% Mean: 4.5 Median: 5.0

1 = Poor, 3 = Fair, 5 = Excellent.

***1 = Strongly Disagree, 3 = Neutral, 5 = Strongly Agree.*

During the COVID-19 pandemic, students reported meaningful and educational service-learning experiences, both in-person and through remote learning modalities. Students were able to apply skills and knowledge gained in the classroom into practice in the community, while also developing new skills and rising to support emerging community needs. They did not miss important lessons or engagement opportunities because of community restrictions, but were flexible and adapted to changes and evolving challenges. Through pandemic-impacted service-learning, students found new ways to interact and learn through remote technology and participate in public health crisis response. Students who participated in these experiences are now better equipped to adapt to future challenges because of this experience and are more prepared to succeed in the workplace in the new normal of remote working.

Community organizations also demonstrated resilience and adapted to community needs, which further enabled students to make substantial contributions to the pandemic relief efforts by assisting with food distribution and early contact tracing, helping at COVID-19 testing sites, and engaging in online outreach efforts. Students directly not only witnessed harsh community disparities first-hand, but also saw the strength, dedication, and creativity of community organizations to modify their services and pivot toward addressing existing and newly exposed disparities, making this a uniquely valuable service-learning opportunity.

Strengths and Limitations

This research study is the first to examine the impact of the COVID-19 pandemic on the state of service-learning within a university that provides practicum statewide. The novel analytic procedure identified three unique stages—COVID-19 Interrupted, Impacted, and Adapted—in which applied learning experiences were changed and community organizations were compelled to pivot. This framework can be tailored and utilized in future studies seeking information on student outcomes during the ongoing pandemic.

One of the limitations of this study was the use of secondary data, which was self-reported, rather than objectively measured. Moreover, the small overall sample size and group sizes limit the impact and generalizability of any results. Response bias should also be noted as a limitation. Those graduates with better experiences in the BAPH program (and APLE) may be more likely to respond to the exit survey. It is also possible that given the one semester break and activities associated with PH 489 students may respond with a more or less favorable representation of their service-learning experience which occurred in the previous semester. Socially desirability may also be present as students may be reluctant to provide negative reviews of practicum supervisors or BAPH advisors and instructors.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Hawai'i at Mānoa. The Ethics Committee waived the requirement of written informed consent for participation.

AUTHOR CONTRIBUTIONS

LK conceptualized and designed the project. DN-H, MT, and LK implemented tools and collected data. LK and UP wrote the first draft of the manuscript. All authors wrote sections of the manuscript, contributed to manuscript revision, read, and approved the submitted version.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the efforts of Ms. Kimberly Inouye, Ms. Kirsten Sensano, and student support staff; the undergraduate program is only possible because of their diligence and excellent work. The authors also recognize the enduring commitment of the B.A. Public Health students and graduates of the University of Hawai'i Thompson School of Social Work and Public Health, especially those whose education was impacted by COVID-19. Mahalo nui loa!

REFERENCES

1. Lee JM, Friedman LH. Progress in the articulation of undergraduate and graduate public health? *Front Public Health*. (2015) 3:e00022. doi: 10.3389/fpubh.2015.00022
2. Seifer SD. Service-learning: community-campus partnerships for health professions education. *Acad Med*. (1998) 73:273–7. doi: 10.1097/00001888-199803000-00015
3. Kuh GD, O'Donnell K, Reed SD, Association of American Colleges and Universities, Liberal Education and America's Promise (Program). *Ensuring Quality & Taking High-Impact Practices to Scale* (2013).
4. Adnan M. Online learning amid the COVID-19 pandemic: students perspectives. *J Pedagog Res.* (2020) 1:45–51. doi: 10.33902/JPSP.2020261309
5. Armstrong-Mensah E, Ramsey-White K, Yankey B, Self-Brown S. COVID-19 and distance learning: effects on georgia state university school of public health students. *Front Public Health.* (2020) 8:576227. doi: 10.3389/fpubh.2020.576227
6. Grenier L, Robinson E, Harkins DA. Service-learning in the COVID19 era: learning in the midst of crisis. *Pedagogy Hum Sci.* (2020) 7:11.
7. Masonbrink AR, Hurley E. Advocating for children during the COVID-19 school closures. *Pediatrics.* (2020) 146:e20201440. doi: 10.1542/peds.2020-1440
8. Doody K, Schuetze P, Fulcher K. Service learning in the time of COVID-19. *Exp Learn Teach High Educ.* (2020) 3:12–6.
9. Hawai'i Public Health Institute. *COVID-19 Hawai'i Resources*. (2020). Available online at: https://www.hiphi.org/covid19/ (accessed January 5, 2021).

10. Hofschneider A. *Pacific Islanders, Filipinos Have Highest COVID-19 Rates In Hawaii*. Honolulu Civil Beat (2020). Available online at: https://www.civilbeat.org/2020/06/pacific-islanders-filipinos-have-highest-covid-19-rates-in-hawaii/ (accessed January 5, 2021).
11. UH News. *University of Hawaii Actions to Address COVID-19 Pandemic | University of Hawai'i System News*. University of Hawaii News (2020). Available online at: https://www.hawaii.edu/news/2020/03/12/uh-actions-address-covid-19/ (accessed September 5, 2021).
12. University of Hawai'i at Mānoa. *About UH Mānoa*. University of Hawai'i at Mānoa. Available online at: https://manoa.hawaii.edu/about/ (accessed August 29, 2021).
13. Beaman A, Davidson PM. Global service-learning and COVID-19—What the future might look like? *J Clin Nurs*. (2020) 29:3607–8. doi: 10.1111/jocn.15369
14. Hawaii Department of Health. *COVID-19 Multi-Languages Resources*. (2020). Available online at: https://health.hawaii.gov/ola/ola-posts/covid-19-multi-languages-resources/ (accessed January 5, 2021).
15. Nelson-Hurwitz DC, Tagorda M. Developing an undergraduate applied learning experience. *Front Public Health*. (2015) 3:e00002. doi: 10.3389/fpubh.2015.00002
16. Council on Education for Public Health. *Accreditation Criteria - Schools of Public Health & Public Health Programs*. Council on Education for Public Health (2016). Available online at: https://media.ceph.org/wp_assets/2016.Criteria.pdf
17. Public Health National Center for Innovations, de Beaumont Foundation. *10 Essential Public Health Services*. 10 Essential Public Health Services (2020). Available online at: https://www.cdc.gov/publichealthgateway/publichealthservices/essentialhealthservices.html
18. Yoder KM. A framework for service-learning in dental education. *J Dent Educ*. (2006) 70:9. doi: 10.1002/j.0022-0337.2006.70.2.tb04067.x
19. Yoder DI, Retish E, Wade R. Service learning: meeting student and community needs. *Teach Except Child*. (1996) 28:14–8. doi: 10.1177/004005999602800403
20. Mackenzie SLC, Hinchey DM, Cornforth KP. A public health service-learning capstone: ideal for students, academia and community. *Front Public Health*. (2019) 7:e00010. doi: 10.3389/fpubh.2019.00010
21. Office of Public Health Preparedness. *Medical Reserve Corps (MRC)*. State of Hawaii, Department of Health (2021). Available online at: https://health.hawaii.gov/prepare/mrc/ (accessed September 5, 2021).
22. Council on Education for Public Health. *Home*. (2021). Available online at: https://ceph.org/ (accessed August 12, 2021).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

APPENDICES

Appendix A. OPHS BAPH Exit Survey (Excerpt)

1. Please rate the following on a 5-point scale (1 = Poor, 3 = Fair, 5 = Excellent)

a. How adequate was the Applied Learning Experience (APLE) that you gained here for preparation for your future?

b. How adequate was the assistance you received in the development and supervision of the APLE of your program?

2. My APLE allowed me to develop skills in basic public health concepts (1 = Strongly Disagree, 3 = Neutral, 5 = Strongly Agree).
3. My APLE allowed me to demonstrate the application of my public health skills (1 = Strongly Disagree, 3 = Neutral, 5 = Strongly Agree).

frontiers | Frontiers in Public Health

CURRICULUM, INSTRUCTION, AND PEDAGOGY
published: 09 May 2022
doi: 10.3389/fpubh.2022.770575

Improving Communication of Public Health Bachelor's Degree Programs Through Visual Curriculum Mapping

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Undergraduate students balance course requirements for the university, college, school, and major. Each set of requirements, including degree-specific curriculum, is intended to promote synergistic interaction of competence, skills, and knowledge, beyond serving as a collection of individual courses. Understanding of curriculum is important for program recruitment as undergraduate students are more informed when deciding between bachelor's degrees options. Among cohorted programs, this understanding is also helpful in communicating and promoting common intellectual experiences. Comprehension of curriculum is especially important for persistence when students are better able to articulate the connections between course and competencies needed to advance in coursework. To improve universal design for learning within program advising, visual curriculum maps were created as infographics to support student understanding of Bachelor of Arts in Public Health degree requirements and specific capstone course pathways. This map is printed as a small booklet and has been pilot tested among prospective students with positive feedback, then implemented in routine advising sessions. Visual maps of capstone requirements were well-received in concept, however constructive student feedback during pilot testing necessitated further revision. Student feedback also encouraged the application of culturally appropriate visuals and analogies to celebrate student diversity. Visual aids such as these may improve access to information among students through universal design, and also improve recruitment, retention efforts, and student buy-in to degree curricula.

Keywords: public health education, bachelor's of public health, undergraduate public health, high-impact educational practices, curriculum, curriculum mapping, universal design for learning, communication tools

OPEN ACCESS

Edited by:
Katie Darby Hein,
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Reviewed by:
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University of North Carolina at Charlotte, United States
Jennifer Pusateri,
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Specialty section:
This article was submitted to Public Health Education and Promotion, a section of the journal Frontiers in Public Health

Received: *04 September 2021*
Accepted: *08 April 2022*
Published: *09 May 2022*

Citation:
Nelson-Hurwitz DC, Tagorda M, Patil U and Kehl L (2022) Improving Communication of Public Health Bachelor's Degree Programs Through Visual Curriculum Mapping. Front. Public Health 10:770575. doi: 10.3389/fpubh.2022.770575

INTRODUCTION

Aligning competencies, courses, and skills are always challenging, but making the connection can benefit tertiary education as much as it does in primary and secondary levels (1–3). Streamlined curricula help students meet overlapping and often daunting requirements of a hierarchical academic setting, and offer a helpful tool for curricula evaluation and program accreditation (4–6). Incorporating student learning perceptions and outcomes are just a few steps toward alignment (7).

Constructive Alignment

Curriculum itself is composed of "materials, processes and interactions comprising a course or programme of study where the goal is to provide new knowledge or skill" (1). The synergistic learning objectives yielded from the alignment of curricula are fundamental to student success. Constructive alignment, a principle of Biggs and colleagues (8), calls for a focus on the sequence of learning activities and tasks to serve student outcome goals, while the overall curriculum provides the linkages that make the sequence frictionless. In this way, the mapping of curriculum is as much a product of students as it is faculty.

Other benefits of careful alignment include preparing students to take responsibility for their journeys down academic pathways, one of the most important goals of a college instructor (9). Beyond the classroom, curriculum alignment and mapping are useful to curriculum that involves service-learning components or professional training (10). An essential objective of undergraduate public health degree programs is to be a conduit for graduates into the constantly evolving public health workforce (11, 12). In this sense, the unique role of the public health instructor closely follows the one espoused by King (13): to be "guides on the side" not "sages on the stage," mainly because faculty cannot control the action on the many "stages" set up in the public health educational theater. And yet it behooves faculty to not simply serve as "peers in the rear," where students can veer off course in pursuit of their own learning objectives—sometimes to the detriment of difficult but essential foundational courses.

The solution is an aligned curriculum where both learner and advisor can observe academic and professional progress at various levels continually (14, 15). Early, consistent branding and communication of an integrated learning experience are essential to student success (16, 17). It not only helps declared majors stay on track but also assists undecided students with a keen interest in health sciences to make informed decisions regarding academic pathways.

Degree programs, such as Bachelor of Arts in Public Health (BAPH), are prime candidates to benefit from organized, aligned curricula that naturally elevate and apply high-impact educational practices (HIEP) through multimodal communication via universal design of learning (UDL). Degree programs in public health often have multiple entryways and sometimes, multiple tracks or specialties, thus making singular curriculum pathways better represented by branching systems.

Visual Communication

Visual communication methods are well-suited for the dissemination of often complex and dynamic pathways to graduation. The etymology of the word "curriculum" is apt here: it can be literally translated as "running a course" (18, 19). Public health education comprises five core disciplines (epidemiology, environmental health, services administration, health education and behavioral science, and biostatistics) that can pull students toward different specialization paths as interests develop (20, 21). Arnold and colleagues also identify various archetypes of public health students—pre-health students, previous pre-med students, future public health workers, undecided students, and idealists—which can enter and exit a BAPH program through different avenues (21).

Within the context of HIEP, visual curriculum maps can help illuminate the continual cooperation of common intellectual experiences, individual electives, service learning or internship degree requirements, and capstone sequences over the degree course (18, 22, 23). Harden, in a seminal work on building curriculum maps in medical science education (22), contends that a visual analog can help curriculum to be viewed from collective perspectives of stakeholders in higher education (e.g., student needs, content coverage, learning locations), while making transparent major learning outcomes (e.g., clinical skill, health promotion, health communication). Additionally, diversity of curricula and balances between course foci (local v. global; individual v. population) is easily ascertained.

In addition to a flowchart of required and elective classes within a department, maps can include minor milestones such as portfolio submissions, successful meetings, training certificate completion, and receipts of filed administrative forms. Multiple sets of requirements for a diverse body of students necessitate user-friendly tools such as tracking documents and dynamic websites adhering to universal design principles. Often, curriculum mapping utilizes a set of standards to ensure accessibility and usefulness.

In this paper, we present a review of efforts to produce, use, share, and evaluate visual curriculum maps to complement advising in the Bachelor of Public Health (BAPH) program at the University of Hawai'i at Mānoa.

PEDAGOGICAL PRINCIPLES

Various pedagogical principles justify the usage of visual curriculum maps while supporting and advising students. Additionally, sets of standards and competencies underlie usage and offer evidence of its relevance and reliability.

Universal Design for Learning

The principles of UDL aim for inclusive but personalized instruction that serves the goals of students and the program alike (24, 25). This is particularly relevant as the classroom becomes more diverse and includes more non-"traditional" students from varied educational backgrounds and practicing varied learning styles (26, 27). Stylistic choices are not limited by universal design, especially when applied to visual curriculum maps. Moreover, a widely available set of simple, low-cost tools are available to help record requisite class and co-curricular information, craft visual curriculum maps, and disseminate these to students via print or digital media.

The development of the UDL framework occurred alongside the growth of undergraduate public health degree programs in the 1990's, and many of these programs are imbued with UDL's guiding principle of providing multiple means of representation, engagement, and expression (25). The inclusion of visual curriculum maps is particularly effective in aiding students to learn in alternative ways (representation) and motivating them as individual learners with unique interests, histories, and needs (engagement).

Any visual analog to the often complex instructions and myriad options during advising sessions is akin to multimodal learning in the classroom. In particular, graphical representations

of complex learning pathways engage students by letting them visualize choices and forecast alternate scenarios—some of which might be of high interest but intimidating due to the hitherto unknown path. And this quasi-gamification of public health degree programs can hold great value in the long term, especially in skill-building and skill maintenance.

By removing the barriers of traditional education, public health programs are trying to foster a comprehensive understanding and retention of subject fundamentals as well as deeper expertise with the various tools of planning assessment, measurement, and evaluation. The better way of determining reception, retention, and application is to offer multiple means of activity (expression)—still a challenge to undergraduate studies at large, let alone public health programs. The end-product itself, an illustrated guide, signals to students of the varied ways to communicate information in the field. This is not unlike the infographic guides used for health promotion and patient navigation. But given the pluralistic structure and flexible materials from which this interdisciplinary subject has been constructed, there is little friction when embedding UDL principles to promote educational equity and increased motivation among students.

CEPH Accreditation

The Council on Education for Public Health (CEPH) provides accreditation to public health programs and schools in the U.S. (28). CEPH works closely with two associations, the American Public Health Association (APHA) and the Association of Schools and Programs of Public Health (ASPPH), to ensure the quality of tertiary public health education through standardization (29, 30). Student and program competencies were determined and are regularly adjusted to reflect desired administrative, instruction, and graduation outcomes.

In this way, the advantage of visual curriculum maps can be gauged by how they help further the goal of meeting CEPH criteria and procedures, particularly in meeting requests for information (31). Core competencies of the students also become more apparent. Students, instructors, and administrators are able to see a trail of potential competencies for each degree specialization being met on a visual representation of the entire program curriculum especially when essential exercises and assignments are included. Cross-cutting competencies—those reflecting the ability of students to communicate well, practice professional behavior, embrace diversity and culture, hone leadership skills, plan programs, understand biological factors underlying common public health concepts, and embrace systems thinking—can not only be determined if they are present but also can be measured and spaced out accordingly to ensure retention well-beyond graduation.

Goal

The underlying foundation of curriculum mapping is to communicate a program or degree curriculum as a cohesive & synergistic system/unit, including scaffolded skill development, rather than a collection of courses. This communication promotes student investment in, and understanding of, the overall curriculum and may be helpful in communicating the need for prerequisite coursework. Visual curriculum mapping, in particular, may serve to communicate individual course requirements and expectations in a more engaging and approachable manner and provides opportunities to share points of contention (hotspots) in the curriculum that require careful, thorough planning, as well as show areas of interest that inspire students to complete prerequisites and either learn or retain foundational knowledge. Omnipresent, relevant symbols and analogs, such as a train journey with stops along the route with tickets checked at specific time points, may allow for a clearer, more approachable understanding of course and curriculum connectivity and interrelationships between requirements.

The goal of this study to better communicate how overall program curricula functioned synergistically, rather than as a collection of courses, with scaffolding of both knowledge and skills. Within the broader BAPH curricula, an additional curriculum map tool was developed and applied to promote student understanding of, and buy-in to, the capstone course series at UHM. Prior to application, students expressed confusion regarding articulation of, and connections between, the three capstone courses, which are heavily scaffolded and anchored in a student-selected project topic (32).

LEARNING ENVIRONMENT

The University of Hawai'i system has identified itself as an indigenous-serving, Hawaiian place of learning (33). It is also classified as an Asian-American Native-American Pacific Islander–Serving Institution (AANAPISI). The University of Hawai'i at Mānoa (UHM) is a public research university and the flagship campus for the University of Hawai'i system. Student enrollment is 17,490 students, with undergraduate students comprising about 72.2% of enrollees (33). Campus demographics reflect a student body composed primarily of residents and high ethnic diversity (34).

The developed visual curriculum maps provide an opportunity to connect with diversity and global learning and root the BAPH degree in Hawaiian culture and include visual aids suggestive of the local environment. Specifically, within the BAPH, which has produced 319 graduates since inception (graduation rates ranging from 82 to 98% in the past 5 years), and currently serves 158 students, there is high ethnic diversity and a high proportion of first-generation college students. Navigating a university system is often challenging among students who are under-represented in higher education (35), and diverse students also commonly struggle with belonging (36–38). Visual curriculum maps provide an opportunity to explain often complex program requirements in an alternate, and often more familiar format for students.

Development Process and Methods

The overall bachelor's curriculum was developed and launched in January 2014, and had since been communicated to students using a university standard, table-formatted program sheet, listing degree requirements, including both required and elective courses. For reasons described in the Pedagogical Principles, visual curriculum maps were developed to improve

communication of both overall degree and course requirements, as well as to promote student buy-in to the curriculum, based on discussions among faculty regarding curriculum milestones to communicate with students.

Visual curriculum analogies and metaphors were conceptualized during discussions with students during routine academic advising and in courses. Application of these analogies to visually represent course requirements was occasionally pilot tested using free-hand drawings on a classroom whiteboard and anecdotally received positive feedback from students. Feedback from students was collected through informal focus groups over two separate semesters. Students expressed an improved understanding of the course, and in some cases, course series curriculum at the conclusion of the in-class discussions, but also described the analogies and discussions as both memorable and supportive in formal evaluations, specifically programmatic exit surveys and in focus groups conducted just prior to graduation.

Visual curriculum map products, (i.e., print materials), were initially developed using slideshow development software, in a similar format as an academic poster. However, the need for a wider range of accessible graphics, and graphic design flexibility required a transition to a web-based infographic design software system. Visual curriculum analogies were translated from conceptual, free-hand whiteboard drawings to formalized graphic presentations using the infographic design software, then distributed to faculty and student support staff for feedback. Based on preliminary feedback from these stakeholders, primarily centered on formatting and clarity, revisions were made. The visual curriculum maps were then printed and pilot tested among individual and small groups of target audience students. The students shared positive feedback, primarily noting appreciation for clarity of tangible steps, courses, and assignments. Minor edits were suggested, primarily highlighting opportunities for clearer connections and misalignments in formatting. After edits were made, visual curriculum maps were printed and widely distributed at strategic time points in academic advising and in course curriculum, (e.g., upon program entry, prior to beginning the capstone course series, and at the beginning of relevant coursework).

DEVELOPMENT AND ASSESSMENT OF TOOLS

To date, two visual curriculum maps have been developed. The visual curriculum map for the overall Bachelor degree program is available through Figshare (**Supplementary Figure 1**). The expanded curriculum map for the three-course capstone experience, which includes writing-intensive coursework and a service-learning or internship component (32, 39, 40), is presented in **Figure 1**. Since the launch of these visual curriculum maps, anecdotal evidence collected through informal focus groups and formal evaluations, specifically programmatic exit surveys and in focus groups conducted just prior to graduation, suggests students have found them to be useful tools and are able to better articulate their understanding of the curriculum during academic advising sessions. Some students found the condensed visual representations overwhelming, suggesting the need to spread maps out over multiple pages, add more white space, and provide opportunities for students to zoom in and out, (implying the need for digitization of currently printed communication tools). Student feedback also encouraged the application of more culturally appropriate analogies as an approach to celebrating student diversity. Faculty throughout the BAPH program reported students entered, and progressed, through their courses with fewer questions and less confusion regarding course articulation and scaffolding.

DISCUSSION

The development of visual curriculum maps is a low-cost intervention to promote a better understanding of degree and course requirements among students in an approachable and engaging manner applying principles to promote universal design for learning. Improved understanding may lead to increased self-efficacy and buy-in from students to the curriculum and degree process, with implications for both persistence and recruitment.

Visual curriculum maps also have the potential to play a critical role in the application of multiple high-impact educational practices. In working with learning communities or cohorted programs, consistent, clear, and unified requirements and processes, such as those communicated through visual curriculum maps, may support the development of common intellectual experiences among peers, even while students may be working through individual project topics. Clear and consistent communication tools may further promote opportunities for students to support each other as peers, though specific topics selected for projects or assignments may vary.

Application of visual curriculum maps has great potential in writing-intensive courses, to improve communication of how scaffolded, supportive assignments, such as outlines or annotated bibliographies, may contribute to the construction of more substantial written assignments.

Future Directions

There is further opportunity for students to better understand connections between course assignments to both the writing process and to the development of their own writing skills. Three additional visual curriculum maps are currently in development. This includes one for an undergraduate introduction to global health course with the intent to explain the scaffolding of assignments to develop a Model United Nations policy paper and subsequent Model United Nations requirements associated with the course.

A second curriculum map is in development to replace the existing map communicating the overall Bachelor degree program curriculum with a more culturally appropriate, and comprehensive, visual representation applying an analogy of the degree program with the Native Hawaiian *ahupua'a* system of land division and water movement (41, 42). This more comprehensive curriculum map would incorporate gamification strategies and require students to collect required coursework or other milestones as represented by foods or natural resources as they journey *mauka* (from the mountain) to *makai* (to the ocean) on a quest to embark on a voyage toward their future launching at

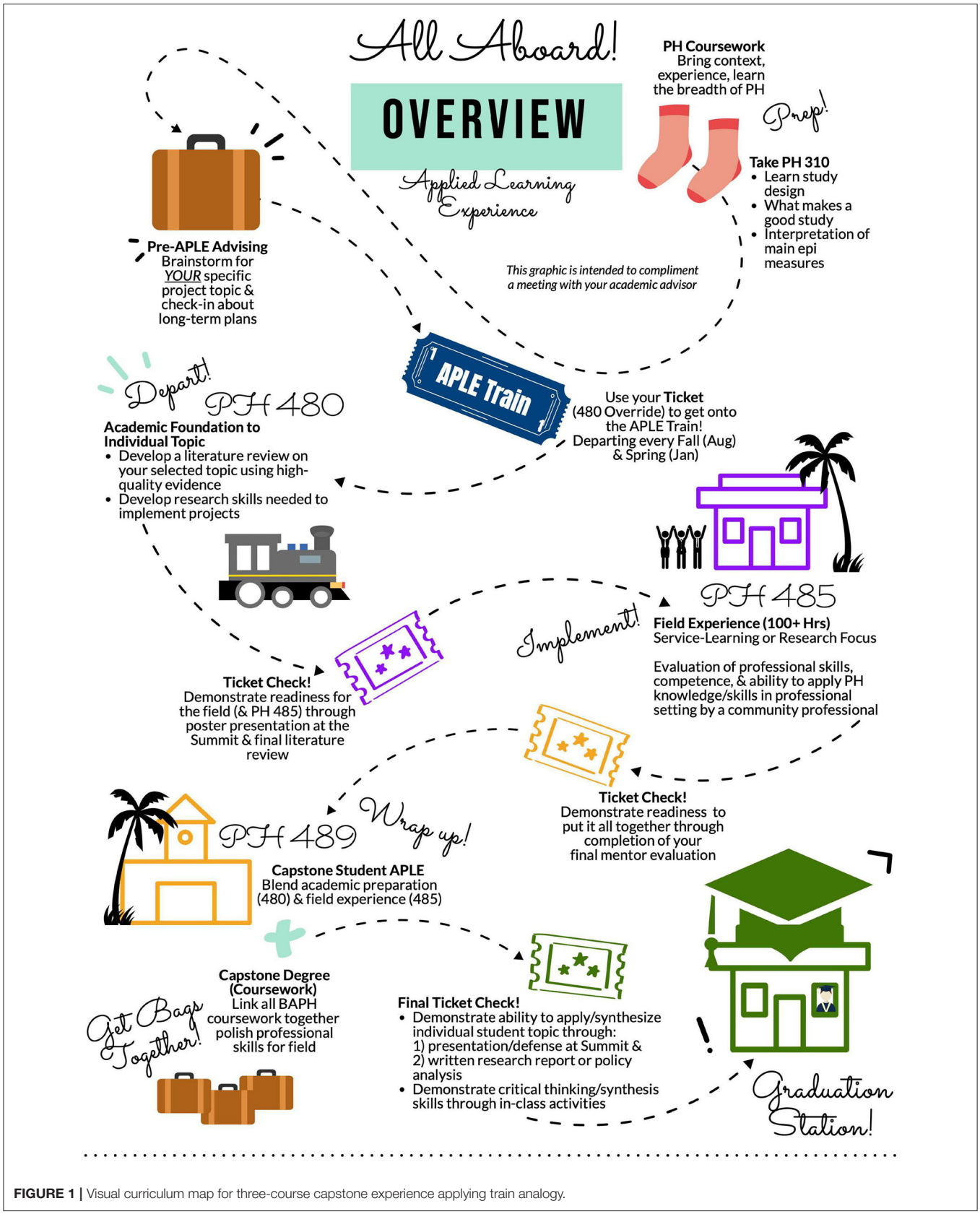

FIGURE 1 | Visual curriculum map for three-course capstone experience applying train analogy.

the time of graduation. This comprehensive map will additionally include sub-maps, pull-outs, and opportunities for students to zoom in on individual courses.

CONCLUSION

Visual curriculum mapping as applied here, evidenced by student and faculty feedback, and in medical science (18, 22, 23) has been an effective tool in communicating degree requirements. Through the application of visual curriculum maps, students in this study report an improved understanding of the overall capstone process, including stronger comprehension of the role played by preparatory coursework and skill development required prior to service learning or internship experience. Improved communication of both required preparation and process allows students to develop more intentionality and self-authorship in their learning process and promotes the value of student-centered learning throughout the capstone experience and overall bachelor's curriculum.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

DN-H and MT contributed conception and design of the project. DN-H designed all tools. DN-H, MT, and LK implemented tools and collected evaluation feedback. DN-H and UP wrote the first draft of the manuscript. All authors wrote sections of the manuscript, contributed to manuscript revision, read, and approved the submitted version.

ACKNOWLEDGMENTS

We gratefully acknowledge the efforts of Ms. Kimberly Inouye, Ms. Kirsten Sensano, and student support staff; the undergraduate program is only possible because of their diligence and excellent work. We also recognize the enduring commitment of the B.A. Public Health students and graduates of the University of Hawai'i Thompson School of Social Work and Public Health.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.770575/full#supplementary-material

REFERENCES

1. Arafeh S. Curriculum mapping in higher education: a case study and proposed content scope and sequence mapping tool. *J Furth High Educ.* (2016) 40:585–611. doi: 10.1080/0309877X.2014.1000278
2. Squires DA. *Curriculum Alignment: Research-Based Strategies for Increasing Student Achievement*. Thousand Oaks, CA: Corwin Press (2009). p. 233.
3. DeLuca C, Bellara A. The current state of assessment education: aligning policy, standards, and teacher education curriculum. *J Teach Educ.* (2013) 64:356–72. doi: 10.1177/0022487113488144
4. Jacobsen M, Eaton SE, Brown B, Simmons M, McDermott M. Action research for graduate program improvements: a response to curriculum mapping and review. *Can J High Educ.* (2018) 48:82–98. doi: 10.47678/cjhe.v48i1.188048
5. Oliver B, Ferns S, Whelan B, Lilly L. *Mapping the Curriculum for Quality Enhancement: Refining a Tool and Processes for the Purpose of Curriculum Renewal*. Gold Coast, QLD: Proceedings of the Australian Quality Forum (2010). p. 9.
6. Perlin MS. Curriculum mapping for program evaluation and CAHME accreditation. *J Health Adm Educ.* (2011) 27–48. Available online at: https://www-ingentaconnect-com.eres.library.manoa.hawaii.edu/content/aupha/jhae/2011/00000028/00000001/art00003
7. Kuhn K-AL, Rundle-Thiele SR. Curriculum alignment: exploring student perception of learning achievement measures. *Int J Learn High Educ.* (2009) 21:351–61. Available online at: https://eprints.qut.edu.au/39467/
8. Biggs J. Enhancing teaching through constructive alignment. *High Educ.* (1996) 32:347–64. doi: 10.1007/BF00138871
9. Chonko LB. A look to the future of marketing education: observations of one teacher-researcher curmudgeon. *Mark Educ Rev.* (2003) 13:1–18. doi: 10.1080/10528008.2003.11488806
10. Rath B, Rock K, Laferriere A. *Pathways Through College: Strategies for Improving Community College Student Success*. Hartford, CT: Our Piece of the Pie (2013).
11. Riegelman RK, Albertine S. Undergraduate public health at 4-year institutions. *Am J Prev Med.* (2011) 40:226–31. doi: 10.1016/j.amepre.2010.10.013
12. Albertine S. Undergraduate public health: preparing engaged citizens as future health professionals. *Am J Prev Med.* (2008) 35:253–7. doi: 10.1016/j.amepre.2008.06.005
13. King A. From Sage on the Stage to Guide on the Side. *Coll Teaching.* (1993) 41:30–5. doi: 10.1080/87567555.1993.9926781
14. Bean JP. Nine themes of college student retention. In: Seidman A, editor. *College Student Retention: Formula for Student Success*. Westport, CT: Praeger Publishers (2005).
15. Pascarella ET, Terenzini PT. *How College Affects Students: A Third Decade of Research*. Volume 2 edition San Francisco: Jossey-Bass (2005).
16. Harrill M, Lawton JA, Fabianke J-C. *Faculty and Staff Engagement: A Core Component of Student Success. Peer Review*. (2015). Available online at: http://eres.library.manoa.hawaii.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=113641793&site=ehost-live (accessed August 28, 2021).
17. Drake SM. *Creating Integrated Curriculum: Proven Ways To Increase Student Learning*. Thousand Oaks, CA: Corwin Press, Inc (1998).
18. Chakrabarti R, Wardle K, Wright T, Bennie T, Gishen F. Approaching an undergraduate medical curriculum map: challenges and expectations. *BMC Med Educ.* (2021) 21:341. doi: 10.1186/s12909-021-02778-6
19. Merriam-Webster. *Curriculum*. Available online at: https://www.merriam-webster.com/dictionary/curriculum (accessed August 28, 2021).
20. Gemmell MK. *A History of ASPH*, 1941-2001. Washington, DC: Association of Schools of Public Health (2004).
21. Arnold LD, Schneider D. Advising the newest faces of public health: a perspective on the undergraduate student. *Am J Public Health.* (2010) 100:1374–80. doi: 10.2105/AJPH.2009.180695
22. Harden RM. AMEE guide no. 21: curriculum mapping: a tool for transparent and authentic teaching and learning. *Med Teach.* (2001) 23:123–37. doi: 10.1080/01421590120036547
23. English FW. Curriculum mapping and management. In: Sattes BD, editor. *Summary and Proceedings of a 1984 Regional Exchange Workshop*. Nashville, TN: Appalachia Educational Lab (1984).

24. Rose DH, Meyer A. *Teaching Every Student in the Digital Age: Universal Design for Learning*. Alexandria, VA: Association for Supervision and Curriculum Development (2002). p. 228. Available online at: https://eric.ed.gov/?id=ED466086 (accessed August 4, 2021).
25. Kennette LN, Wilson NA. Universal design for learning (UDL): what is it and how do I implement it? *Transform Dialog Teach Learn J.* (2019) 12:6. Available online at: http://www.kpu.ca/sites/default/files/Transformative%20Dialogues/TD.12.1_Kennette&Wilson_UDL_Implementation.pdf (accessed December 18, 2021).
26. Boothe KA, Lohmann MJ, Donnell KA, Hall DD. Applying the principles of universal design for learning (UDL) in the college classroom. *J Spec Educ Apprenticeship*. (2018) 7:13. Available online at: https://files.eric.ed.gov/fulltext/EJ1201588.pdf (accessed December 18, 2021).
27. Kennette LN, Wilson NA. Universal design for learning (UDL): student and faculty perceptions. *J Eff Teach High Educ.* (2019) 1:26. doi: 10.36021/jethe.v2i1.17
28. *Council on Education for Public Health. Home*. (2021). Available online at: https://ceph.org/ (accessed August 12, 2021).
29. Association of Schools and Programs of Public Health, Association of American Colleges and Universities, Association for Prevention Teaching and Research, Centers for Disease Control and Prevention. *Undergraduate Public Health Learning Outcomes, Final Model Version 1.0*. Washington, DC: Association of Schools and Programs of Public Health (2011). Available online at: http://www.aspph.org/educate/models/undergraduate-learningoutcomes (accessed December 18, 2021).
30. American Public Health Association. *American Public Health Association*. (2021). Available online at: https://www.apha.org/ (accessed September 1, 2021).
31. *Council on Education for Public Health. Required Data*. (2021). Available online at: https://ceph.org/about/org-info/criteria-procedures-documents/required-data/ (accessed September 1, 2021).
32. Nelson-Hurwitz DC, Tagorda M. Developing an undergraduate applied learning experience. *Front Public Health*. (2015) 3:2. doi: 10.3389/fpubh.2015.00002
33. University of Hawai'i at Mānoa. About UH Mānoa. *University of Hawai'i at Mānoa*. Available online at: https://manoa.hawaii.edu/about/ (accessed August 29, 2021).
34. Myers B. The flagship diversity divide. *The Chronicle of Higher Education*. (2016). Available online at: https://www.chronicle.com/article/the-flagship-diversity-divide/ (accessed August 29, 2021).
35. Bauman S, Acker-Hocevar M, Talbot DL, Visaya A, Valencia M, Ambriz J. Exploring and promoting the college attendance and success of racial/ethnic minority students. *J Multicult Couns Devel.* (2019) 47:37–48. doi: 10.1002/jmcd.12119
36. Chang J, Wang S, Mancini C, McGrath-Mahrer B, Orama de Jesus S. The complexity of cultural mismatch in higher education: norms affecting first-generation college students' coping and help-seeking behaviors. *Cultur Divers Ethnic Minor Psychol.* (2020) 26:280–94. doi: 10.1037/cdp0000311
37. Kim J, Miller S, Hwang J, Olson J. Female first-generation college students: a review of challenges and successes. *J Glob Educ Res.* (2021) 5:136–50. doi: 10.5038/2577-509X.5.2.1076
38. Soria KM, Stebleton MJ. First-generation students' academic engagement and retention. *Teach High Educ.* (2012) 17:673–85. doi: 10.1080/13562517.2012.666735
39. Nelson-Hurwitz DC, Lee TH. Redesigning an undergraduate global health course to increase student engagement and incorporate high-impact educational practices. *Pedagogy Health Promot*. (2020) 7:204–13. doi: 10.1177/2373379920974396
40. Nelson-Hurwitz DC, Buchthal OV, Tagorda M, Braun KL. Adding a baccalaureate degree to a graduate public health program while addressing stakeholder concerns. *Pedagogy Health Promot*. (2019) 5:132–8. doi: 10.1177/2373379918794703
41. Keaulana S, Kahili-Heede M, Riley L, Park MLN, Makua KL, Vegas JK, et al. Scoping review of nature, land, and environmental connectedness and Relatedness. *Int J Environ Res Public Health*. (2021) 18:5897. doi: 10.3390/ijerph18115897
42. Kana'iaupuni SM, Malone N. This land is my land: The role of place in native hawaiian identity. *Hūlili: Multidiscip Res Hawaiian Well Being*. (2006) 3:281–308. Available online at: https://kamehamehapublishing.org/wp-content/uploads/sites/38/2020/09/Hulili_Vol3_14.pdf

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers | Frontiers in Public Health

CURRICULUM, INSTRUCTION, AND PEDAGOGY
published: 17 May 2022
doi: 10.3389/fpubh.2022.877547

Transforming Perspectives Through Virtual Exchange: A US-Egypt Partnership Part 1

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With more classrooms within higher education mobilizing strategies for internationalization, collaborative online international learning (COIL), also referred to as virtual exchange, is an effective approach at offering intercultural competence through experiential learning. This strategy provides students who face barriers to international travel the opportunity to engage with students from other countries in meaningful ways, while enhancing and reinforcing course content. Grounded in the transformative learning theory, this study evaluates the effectiveness of a virtual exchange that was implemented within an undergraduate global public health course. The virtual exchange connected students from the University of Florida (within the US) with medical students in a microbiology course at Ain Shams University in Cairo, Egypt. Using adapted reflection prompts, we assessed the students' knowledge and learning before, during, and after the virtual exchange. This was coupled with a final paper to capture how personal backgrounds and experiences may contribute to their perception of the virtual exchange, as well as if they felt their global perspective had changed or shifted during the experience. Using directed content analysis for each of the measurements, two researchers coded the data independently to then present agreed upon salient themes to the larger group. Of the 28 randomly sampled students who participated in the virtual exchange, seven major themes emerged from the data: Connectedness; Openness; Acquisition of Knowledge and Skills; Communication; Cultural Identity; Anticipation of Options for New Roles, Relationships, and Actions; and Absence of Change. Through this evaluation it was clear there was a variance of different perspectives with many sampled students having diverse lived experiences that influenced their worldview prior to the virtual exchange. Despite course-related barriers, students acknowledged several facilitating factors that improved their intercultural competence and knowledge of course content. The integration of a virtual exchange within the classroom, with careful design and implementation, can provide a unique experience for students and an inclusive approach to learning.

Keywords: collaborative online international learning (COIL), virtual exchange, internationalization, global public health, transformative learning theory (TLT)

OPEN ACCESS

Edited by:
Andrew Harver, University of North Carolina at Charlotte, United States

Reviewed by:
Johannes M. Luetz, University of New South Wales, Australia
Shi Chen, University of North Carolina at Charlotte, United States

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Specialty section:
This article was submitted to Public Health Education and Promotion, a section of the journal Frontiers in Public Health

Received: *16 February 2022*
Accepted: *21 April 2022*
Published: *17 May 2022*

Citation:
Wood EA, Collins SL, Mueller S, Stetten NE and El-Shokry M (2022) Transforming Perspectives Through Virtual Exchange: A US-Egypt Partnership Part 1. Front. Public Health 10:877547. doi: 10.3389/fpubh.2022.877547

INTRODUCTION

With the rising belief that internationalization is critical to higher education institutions, differences in the ability to offer comprehensive services can affect the competitiveness of the institution (1). Internationalization is defined as the "institutional process that in some way internalizes the concept of openness to the world in all the activities and organizational aspects of the university, and it may even launch an internal transformation to prepare the university to act more directly on the international or global scene" (2, para 1). Through internationalizing curriculum in higher education institutions, students are more prepared to navigate a global economy and promote academic mobility (2, 3). The stewardship of internationalization within an institution is crucial in ensuring quality of education and advising, increasing academic mobility and collaborative scholarship, and building a culture focused toward inclusiveness and consistency of services across a campus. Internationalization may manifest in several ways within higher education, specifically through collaborations in teaching, study abroad programs, as well as the continued support of international students (4). The proliferation of instructors integrating an international or global dimension within their courses and/or curriculum has led to a more common and fluid use of collaborative online international learning (COIL), also referred to as virtual exchange.

COLLABORATIVE ONLINE INTERNATIONAL LEARNING

COIL is a contemporary pedagogical approach to offering international, online exchanges between students to foster intercultural competence, digital literacy, and global self-awareness predominantly among peers with different linguacultural backgrounds (5–7). Using internet-based tools and online platforms for sharing materials, COIL promotes meaningful exchanges with students who are in different geographical locations. It is reflective of the overarching pedagogical approach that informs experiences such as virtual exchange, which ultimately describes the mechanism in which university students receive immersive short-term cross-cultural experiences. Prior to COIL, many turned to other forms of cultural immersion such as study abroad programs (8). However, COIL offers a contemporary solution to having students integrate constructs of intercultural competence into their normal daily lives rather than being physically immersed in another geographic location (9). It has also been effective during the COVID-19 pandemic with travel restrictions. COIL can be integrated into a course on a small scale (e.g., international guest lecturer) or larger scale (4–5 week modules with synchronous/asynchronous exchanges). Through the integration of internationalization within curriculum, students are more likely to engender these facets of COIL as well as cultivate a synergy between coursework and international relationships that may be lacking in traditional faculty-led study abroad sojourns (10). Furthermore, cooperative learning, a subset of collaborative learning, within COIL bolsters active and team-based learning styles through meaningful activities where students work together to problem solve; thus, augmenting their interpersonal and social skills (4, 10–12). Moreover, through collaborative learning, students are able to procure more responsibility working together in groups in order to build their knowledge through active engagement (13).

Foreign language courses have dominated the virtual exchange arena for many years, however, with new technologies in the classroom coupled with the increased digital literacy due to COVID-19-induced classroom dynamic shifts, other disciplines are benefiting from international collaborations (14). Guided by Mezirow's transformative learning theory (15), this virtual exchange sought to explore what students' perceptions and attitudes were around cross-cultural collaborative online international learning as well as to determine how a COIL experience may impact students' global self-awareness, perspective-taking, and intercultural communication within a global public health setting (15). Likewise, whether cultural perspective can influence a student's social and learning behavior. Finally, researchers wanted to assess how the virtual exchange has impacted students' perceived gains in learning global public health. In order to develop more autonomous thinkers and capture the unconscious shift to consciousness within the transformative learning paradigm, this virtual exchange implemented self-reflection activities before, during, and after the global learning experience.

The goal of this study was to better understand students' attitudes and perceptions about cross-cultural collaborative online international learning, while also assessing how this COIL experience impacts students' global self-awareness, perspective-taking, and intercultural communication. Through implementing the stages of the Transformative Learning Theory, we hope to capture how a virtual exchange has impacted the students' perceived gains in learning global public health. For the purposes of this study, authors chose to use the term "virtual exchange" rather than the broader term COIL to capture the telecollaborative nature of this experience.

MATERIALS AND METHODS

Virtual Exchange Preparation

This virtual exchange occurred with Ain Shams University (ASU) in Cairo, Egypt and the University of Florida (UF) in Gainesville, Florida in the United States (US). Faculty from ASU's undergraduate medical program and UF's undergraduate public health program collaborated to design and implement a 5-week module for students with a global health focus (**Appendix A**). Drs. Mona El-Shokry and Elizabeth Wood participated in a Virtual Exchange Training Program hosted by UF in Fall 2020 with the intention of implementing a virtual exchange program in March 2021. In total, there were 108 UF students total who participated in the virtual exchange through a global public health course and 32 ASU students who participated voluntarily in addition to their normal coursework. The discrepancy between groups was a consequence of more students being added to the UF global health course due to demand. Sixteen groups were randomly formed for the virtual exchange with six UF students

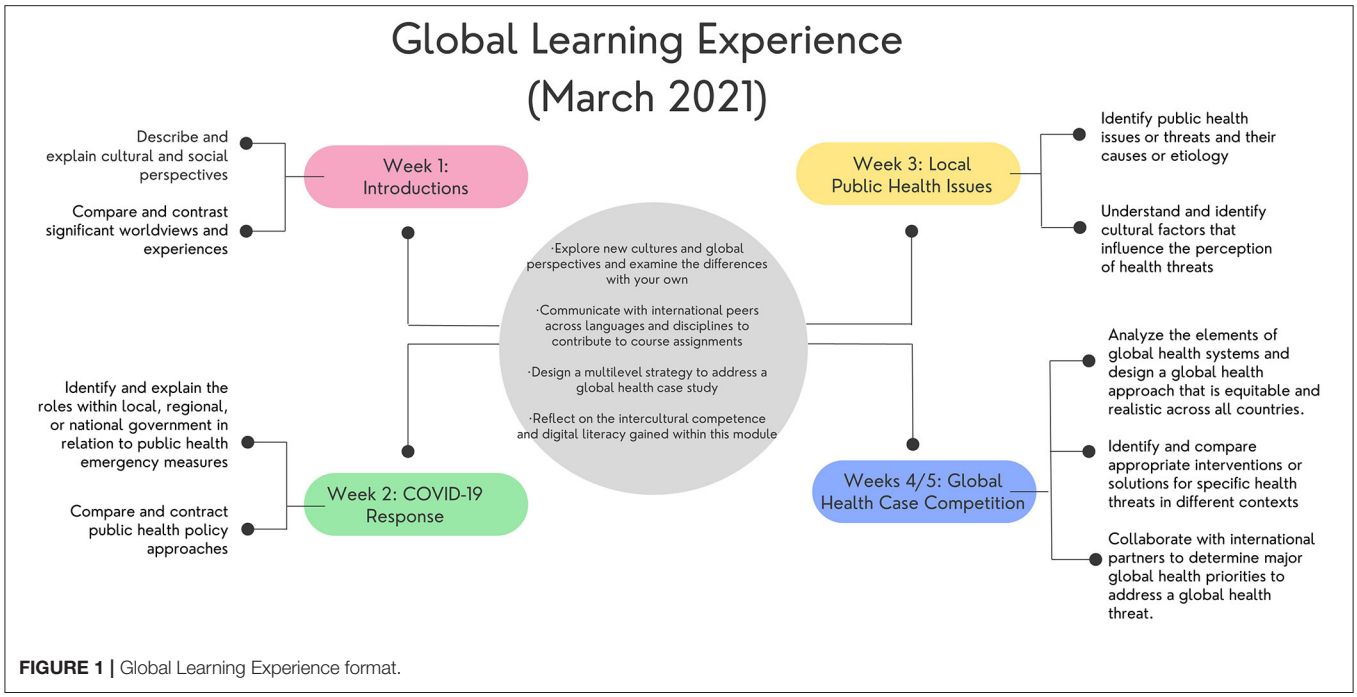

FIGURE 1 | Global Learning Experience format.

and two ASU students per group to avoid having only one ASU student per group and having too large of groups due to the number of UF students participating. Despite having 16 smaller groups, students from both universities regularly conversed as a whole through the elearning Canvas shell that all students had access to.

Course Pedagogy

Similar to a study abroad departure training, instructors hosted an online, synchronous Zoom meeting for ASU students and an onboarding training for UF students in February during the course semester. Onboarding included preparation for students with intercultural communication, reviewing diverging cultural norms and dimensions, as well as supplemental information on the respective country. A follow-up lecture was also provided midway through the virtual exchange to discuss culture shock, common stressors, and ways to navigate communicating with someone from another country.

The 5-week module was designed to have small group discussions within an elearning management system (Canvas) where students could exchange thoughts and ideas around weekly topics. However, students were not limited to Canvas and could communicate independently with each other through other modalities (e.g., Marco Polo, Zoom, WhatsApp, etc.). **Figure 1** outlines the student learning objectives for each week, combining weeks four and five to accommodate a third wave of COVID-19 in Cairo at the time.

Data Collection

UF students engaged in reflective activities throughout the virtual exchange program, including answering reflection questions provided by The State University of New York (SUNY) COIL Stevens Initiative Assessment (16). The assessment provides pre-, mid-, and post questions. Questions were adapted to reflect UF's global public health course objectives (**Appendix B**). The pre-, mid-, post responses were due during weeks zero, three, and five, respectively. In addition to the SUNY COIL assessment, an individual analysis paper (IAP) prompting students to reflect on the entirety of the virtual exchange experience was the final assessment (**Appendix C**).

Upon the conclusion of the semester, UF student responses to the outlined assessments were exported from Canvas and de-identified. Each student was provided a code to indicate their reported sex, race/ethnicity and a student number in order to match their assessments. Researchers organized students based on sex and found that only 11 out of the 108 UF students were male. To include all male participants, 2:1 matched sampling for each male's reported race/ethnicity was conducted[1]. Therefore, the researchers stratified the female students according to their reported race/ethnicity and randomly selected students using a random number generator to meet the 2:1 matching criterion. This sampling method yielded 35 students. Inclusion criteria required students to complete all four time points and to have answered each prompt in its entirety. The final sample was 28 students.

Data was organized according to each assessment item. For example, all student responses to pre-assessment question one were compiled into one document and labeled according to student ID. This was completed for pre-assessment questions two, three, and so forth for all assessment items. This data cleaning and management process is considered a useful strategy

[1]There were no reported "two or more races" males, but researchers still randomly selected two females from this ethnic/racial group.

TABLE 1 | Codebook.

Theme	Operational definition
Self-examination with feelings of fear, anger, guilt or shame (1)	Internal reflection of held beliefs, attitudes, assumptions, biases, etc. [assumptions] and having an emotional response as they navigate through the reflection.
A critical assessment of assumptions–(2) Part A	An objective ponderance of initial reflection and clearly defining previous [assumptions].
A critical assessment of assumptions–(2) Part B	Within defining their previous [assumptions], they also recognize their aspiring [assumptions].
Recognition that one's discontent and the process of transformation are shared (3)	The acknowledgment that the individual is not isolated in experiencing dissonance and/or discomfort with previous [assumptions].
Exploration of options for new roles, relationships and action	Participant contemplation of options to integrate new [assumptions] via personal identity, interactions, and personal behaviors
Planning a course of action	Implicit or explicit presentation of how participants intend to employ new personal identity, interactions, and personal behaviors as related to refined [assumptions].
Acquiring knowledge and skills for implementing one's plans	Intentionally noted effort (or a clearly defined action item) to [actively] obtain knowledge from new information, as well as behavioral skills to implement one's course of action.
Provisional trying of new roles	Preliminary attempts to actively engage in new personal identity, interactions, and personal behaviors.
Building competence and self-confidence in new roles and relationships	Continued execution of new roles, thus explicit mention of expanding beyond the classroom context, practicing relevant behaviors on a routine basis, etc. which in turn, increases self-efficacy within new [assumptions].
A reintegration into one's life on the basis of conditions dictated by one's new perspective	An expression that the refined assumption is now perceived as habitual, routine, easy (i.e., without precontemplation) within one's everyday life.

in establishing trustworthiness of a study (17). Trustworthiness depicts the quantitative equivalent, validity, with our efforts specifically aiming to enhance the study's credibility and the dependability or stability of the data (18). This study was approved by the University of Florida Institutional Review Board (IRB#: IRB202003293).

Data Analysis

Student responses were analyzed using a combination of directed content analysis and inductive/open content analysis. The results from the directed content analysis will be the focus of this manuscript and the results of the inductive content analysis are expanded upon in Part B (19). The researchers used Mezirow's Transformative Learning Theory as the guiding theoretical framework for a directed content analysis (15), which utilizes deductive processes to code text to further expand on or validate an existing framework (20). Though there are traditionally 10 stages, the first stage, *disorienting dilemma*, was omitted from data analysis because the virtual exchange program itself is thought to be the disorienting dilemma. Further, the second stage was broken into two parts to illustrate the two-part reflection required to fulfill this theme. The researchers collaborated on developing appropriate operational definitions based on the existing language used for each learning stage. Themes and operational definitions used within the directed content analysis can be seen in **Table 1**. For codes that did not fit into the predetermined themes (Mezirow's 10 stages), inductive coding was used to identify repetitive codes. A more detailed account of inductive coding procedures can be found elsewhere (19).

Two coders independently performed directed content analysis, hand coding line-by-line. The researchers followed suggested qualitative analysis steps put forth by Mayring (21, 22) with minor adaptations to the outlined procedure. Independent analysis allowed each researcher to reach their own conclusions for data categorization within Mezirow's theoretical framework. Negotiations were performed after each data set was completed (Pre, Mid, Post, and IAP), rather than after working through 10–50% of the data, as suggested by Mayring (21, 22), to maintain consistency among data sets. During each negotiation, the researchers iteratively redefined the operational definitions based upon the findings and re-coded, line-by-line, until they reached 100% agreement, thereby increasing inter-coder reliability (23, 24). Following the completion of the IAP data analysis negotiation, the researchers revisited all data to ensure continued fit to the finalized theme operational definitions, as recommended by Hseih and Shannon (20).

A unique aspect of content analysis is the significance of a theme is partially determined by its prevalence (25). Upon completing all qualitative data analysis, the frequencies of each theme were quantified to determine each theme's overall prevalence. Themes were only counted once per student response per item, despite the frequency of presentation of the theme within each response. Furthermore, each student response may have multiple themes present.

RESULTS

The final sample for this study consisted of 28 randomly selected students from a total sample pool of 108 who completed the Global Learning Experience (GLE) within the UF undergraduate Global Public Health course. The majority of sample participants were female (68%). There was a wide distribution of racial and ethnic representation within the sample, including White, non-Hispanic (36%), White, Hispanic (25%), Black (25%), Asian (11%), and two or more races (3%). Final frequencies for each theme can be found in **Table 2**. Themes are presented below according to their position in Mezirow's Transformative Learning Theory (TLT).

Self-Examination With Feelings of Fear, Anger, Guilt, or Shame (1)

The first theme described when individuals express an internal reflection of their assumptions and have an emotional response as they navigate through the reflection. Though the title of this theme reflects negative emotions, these emotions were scarcely

TABLE 2 | Frequency of themes.

Themes	Categories (if applicable)	Data collection round				
		Pre-VE	Mid-VE	Post-VE	IAP	Total
Self-examination with feelings of fear, anger, guilt, or shame		5	7	2	6	**20**
A critical assessment of assumptions		1	21	12	18	**52**
	A critical assessment of assumptions–Part A	12	13	10	10	**45**
	A critical assessment of assumptions – Part B	0	0	0	0	**0**
Recognition that one's discontent and the process of transformation are shared		1	0	1	0	**2**
Exploration of options for new roles, relationships, and action		0	3	11	7	**21**
Planning a course of action		0	0	12	3	**15**
Acquiring knowledge and skills for implementing one's plans		0	2	3	7	**12**
Provisional trying of new roles		0	1	7	6	**14**
Building competence and self-confidence in new roles and relationships		0	0	0	0	**0**
A reintegration into one's life on the basis of conditions dictated by one's new perspective		0	0	0	0	**0**

expressed. Among the few, one student simultaneously expressed gratitude and guilt when they state, "We are lucky that English is such a common language and I feel bad that we cannot converse in a language they are more comfortable with."

Instead of the negative emotions, including fear, anger, guilt, or shame, students more commonly expressed feelings such as surprise or shock. One student noted, "What surprised me the most in this module was how some people can be unaware of cultural differences and would have to learn how to speak to others." Another student expressed an emotional realization when engaging with the Egyptian partners, "I think that I honestly have been a little shocked by some of the differences in the issues we have discussed together." One of the more interesting emotional reactions was one student's expression of relief. They note that though the GLE came as a culture shock, it made them "more relieved to see that our cultures had more similarities than the differences [they] had initially anticipated." This may insinuate some preexisting anxiety in cross-cultural interactions and students' beliefs that they would not share any commonalities with their Egyptian counterparts. Identifying these positive emotional experiences provides a unique aspect of the TLT.

A Critical Assessment of Assumptions (2)

Traditionally, the second theme is presented as a singular stage; however, to extract the nuanced phases of a critical assessment, two categories were developed: (2a) an objective baseline reflection and clearly defining previous assumptions; and (2b) within defining their previous assumptions, they also recognized their aspiring assumptions. If an individual presented both aspects within a single item response, they were classified under (2) "a critical assessment of assumptions." In contrast, if an individual only presented a portion of the requirement to demonstrate a critical assessment, they were classified under the appropriate category. This theme, followed by category 2a, was the most prevalent TLT theme identified within student responses.

There were several accounts of comprehensive critical assessments (2). One student's comment can summarize a typical assessment, "It really helped me to not think so United States centric…" Students' ability to recognize their US-centric experiences assisted in their ability to assess their assumptions critically. One student explains, "I feel we are more likely to resort to thinking that countries outside the US are drastically different, but [the] truth is they have a lot more in common than we may perceive." One student implicitly noted the relational discourses that are often reflected between American[2] society and other countries, by stating, "I had the misconceived connotation that most countries…were technologically and industrially behind—prohibiting them from sharing a similar perspective to my own. However, after talking with my Egyptian peers and learning more…, this was a very generalized view of [the] entire population." These examples demonstrate a transformation of thought where students actively refocused their assumptions that position American society parallel to international partners rather than at the center of conversation.

Interestingly, students who engaged in 2a also noted biases that are seemingly grounded in American norms without completely identifying a shift in perception and development of new assumptions. One student stated, "I think I tend to be biased and view life from an American-centered lens, but that

[2]America/n in this context refers to a person from the United States.

is not true for the rest of the world," while another echoed those sentiments by expressing, "Sometimes I feel as if we get stuck in a bubble here in America and believe everyone in the world functions at the same time we do, especially when a lot of us UF students do not communicate internationally on a daily basis." One student expanded upon this idea and generalized beyond their own experiences. "My thought process was more in-line with a more outdated, inaccessible population. I believe Americans are under the impression that other countries, especially African countries, are struggling, and [its] citizens don't have access to many of the advancements we do." These examples demonstrate a strong reflection of their assumptions but simply fail to explicitly state how their assumptions have changed. Predictably, no student engaged only in category 2b where they recognized their aspiring assumptions without first determining their preexisting assumptions.

Recognition That One's Discontent and the Process of Transformation Are Shared (3)

This theme of the TLT only manifested twice in the data. This theme presents one's acknowledgment that they are not isolated in experiencing dissonance and/or discomfort with their previous assumptions. One student overtly stated, "As we talked about in class, we all had our previous thoughts about Egypt and Egyptians." Though this does not explicitly state their preconceptions of Egypt or Egyptians, it highlighted that more than one individual had shared experiences. Interestingly, the other instance of this theme presented a collective "we" in overcoming assumptions, "I think that our assumptions about each other will be surprising to overcome as we learn how to work in international groups." This presents a different facet of this theme. It demonstrated that a student's perception of a collective transformation is just as influential as an actual collective transformation. Though we don't know if other students openly shared their transformation process with this student, it is inferred that they believe their American peers were undergoing the same discontent and dissonance as them.

Exploration of Options for New Roles, Relationships and Action (4)

This theme starts the beginning of a transition from a cognitive exploration to actionable behaviors in one's TLT experience. Specifically, this theme arises when individuals contemplate options to integrate their new assumptions based on the previous themes. Exploration of options ranged from the ways a student could immediately engage in new roles or relationships with their new assumptions to the delayed options such as career integration. For example, one student stated, "Also, [the GLE] has even given me a new view on the different people around me. For example, being at UF I may meet people from different cultural backgrounds and can now be more likely to be open to learning from them." In contrast, another student explored how the GLE will influence their practice as a future physician, "I gained a new perspective on how another country may view Americans. I would be able to apply this perspective in the future with patients from another culture in making them more comfortable." Though these examples range in implementation over the course of one's life, they provide specific examples where students can employ their new assumptions.

Planning a Course of Action (5)

This theme represents an implicit or explicit presentation of how participants intended to employ their new assumptions. This theme predominately centers on how students plan to be an active agent in their learning, which is demonstrated through active statements to utilize their new assumptions. Some students discussed taking steps to validate their new skills, such as one who says, "In the future I would like to be able to visit another country and see for myself that I am able to use these newly gained cultural skills." Others expressed their intention to increase their global awareness and competency by actively engaging in international news and events, "However, being in America it seems like most international news you hear is from China or maybe France or only if there is a natural disaster somewhere. I would now like to try to go out of my way to learn about current events internationally."

Acquiring Knowledge and Skills for Implementing One's Plans (6)

The acquisition of knowledge and skills is described as an intentional effort or action item to obtain new information to implement one's plan. One student said, "After reflecting on the Egyptian students' experiences, I contacted them privately with more questions." This depicted how the Egyptian partners served as an invaluable resource due to their lived experiences providing unparalleled insight into cultural norms and experiences. Other students echoed this sentiment stating the experiences made them "want to listen and ask questions to [their] peers." Students built upon the GLE relationships to obtain more detailed information or expand on a topic they had a personal interest in. For example, one student stated, "I want to explore other cultures' foods more! In our introductions, an international peer shared their favorite dish (chicken schwarma). I found a recipe and made it the next day- it was amazing!" Ultimately, this acquisition of knowledge and skills further the students' ability to implement their plan and simultaneously increase their cultural competence.

Provisional Trying of New Roles (7)

When students reach this stage, they are working to codify their action plan. These include preliminary attempts to actively engage in new personal identity, interactions, and/or personal behaviors based on their new assumptions. One student plainly stated, "It also is great to undergo trial and error with working internationally which is a critical component in global health I am experiencing first hand." Others described this experience by stating, "During the case study project, it was important for us to listen to the feedback [our Egyptian partner] had about what we wanted to try to implement in a university in Egypt. His feedback allowed us to ensure that what we were trying to do would be successful and allowed us to also tweak aspects that do not make sense in the context of an Egyptian university." Finally, some students made statements that demonstrated their materialization of new assumptions. For example, one student

stated, "I am glad that my experience with my Egyptian peers went well, and there are a few small takeaways that I was able to come up with, but these mainly relate to public health. An Egyptian person of a different economic status or race may have had completely different views or a different personality than our peers, so I believe small takeaways better than large generalities, which may lead to stereotypes." Though not as explicit as the other examples, this depicts a cognitive shift that aims to avoid stereotypes and misconceptions, thus is an equally valuable example of implementation of new assumptions. It should be noted that not all students who presented provisionally trying new roles engaged in previous stages.

Other Themes

Neither of the final two themes presented, "Building competence and self-confidence in new roles and relationships (8)" or "A reintegration into one's life on the basis of conditions dictated by one's new perspective (9)" were identified within the data. This may be due to the short nature of the GLE.

DISCUSSION

Through this iteration of a global public health course, the addition of a virtual exchange was clearly appreciated by the students, especially during a time when international travel was limited. The acquisition of knowledge through various forms of interactive, autonomous, scaffolded learning broadly improved intercultural competence and offered a synergistic way of teaching course content. In many cases interacting with their international peers offered a positive experience despite coping with frustrations such as a 6-h time difference and coordinating times to meet. Both positive and frustrating experiences are collectively captured within studies and reports that implemented a virtual exchange that yielded greater overall intercultural awareness (4, 16, 26). Despite never meeting face-to-face, students were still able to socially interact in meaningful ways through various virtual modalities. It was intentional that students were able to choose their own platform(s) for communication to ensure they were comfortable throughout the collaborative process. Both Driscoll in 1994 (27) and Graham and Misanchuk in 2004 (28) describe these interactive, group work activities as facilitating factors for the development of decision-making and problem-solving skills. Furthermore, Johnson and Johnson (29) state how within collaborative learning, students begin to appreciate heterogeneity, which can culminate into perspective-taking and feelings of assent.

The positive experiences that were captured through this study have been reinforced through previous literature, specifically around strengthening the application of course content (16, 30, 31). Findings demonstrate how through this virtual exchange, students can apply the skills they have learned in their future endeavors, be it within the workforce or higher education. Moreover, partnering with students who were not only international peers, but also from adjacent disciplines (medicine and microbiology), has been shown to improve veritable communication, comprehensive troubleshooting, and knowledge application (32, 33). Additionally, the findings related to student assumptions demonstrate how a substantial number of students reported that their international peers were quite similar to both themselves and practices within the US. This discovery heightens their nascent intercultural awareness and perspective-taking, and specifically addresses areas of ethnocentrism, such as asserting universal values (16, 34).

From a student learning perspective, the findings reveal that students generally either built upon pre-existing knowledge or created the foundation for new knowledge around course content and other cultures. While measuring cultural competence is required for many accrediting bodies in higher education, cultural humility more fully captures and represents the aim of this study. We recognize that this study captures change over time, however, we are also acutely aware that cultural humility and awareness is not finite and require lifelong learning and transformation (16, 35–37). Moreover, while cultural humility and awareness may have increased during this virtual exchange, it is likely to wax and wane as the students' lived experiences and perspectives unfold over time.

CONCLUSION

During a time when international travel was untenable for most of the population, virtual exchange allowed for students and instructors to engage with international partners in the classroom. While virtual exchanges may not be a panacea for global interaction, the approach addresses several lacunae within the classroom around immersive dialogue, inclusive international experiences, and global self-awareness (16, 38, 39). The integration of virtual exchange, even in the most basic form, creates the opportunity for instructors to develop introspective, erudite students who are challenged into participating outside their comfort zone to foster greater self and cultural awareness.

LIMITATIONS

Two limitations existed in this study including the data collection method and the time frame available. The data collection method followed a structured, written-response format, hindering further exploration of prominent inductive themes or ideas. This study may have benefited from data triangulation through in-person interviews after the conclusion of the exchange to support richer responses that may have proven beneficial in identifying the subtle changes along the transformative learning cycle. Semi-structured question interviews that support thematic analysis may have been a supplemental addition to the data collection.

Additionally, while the study spanned a 5-week time period, which was sufficient to demonstrate some momentous change along Mezirow's transformative learning theory, it may not have been sufficient to demonstrate the entire cycle. Had these students been followed up within 3–6 months after the conclusion of the virtual exchange, they might have demonstrated the entire cycle, which was not seen in our study. It was also impractical to assess a reintegration into one's life in such a short time span, as this encompasses activities outside the classroom. An opportunity for additional studies could be virtual

exchanges performed over a longer period or incorporating an additional follow up period.

DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found at: https://original-ufdc.uflib.ufl.edu/IR00011736/00001.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Florida Institutional Review Board. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements. Written informed consent was not obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

AUTHOR CONTRIBUTIONS

EW contributed to preliminary discussions regarding research design and corresponding methodologies, collected data, wrote the introduction, part of the methods, discussion, and conclusion sections of this manuscript. SC contributed to preliminary discussions regarding research design and corresponding methodologies, conducted data analysis procedures, wrote the pedagogical theory, methods, and results sections of this manuscript. SM conducted data analysis procedures, wrote the results, and limitations sections of this manuscript. NS contributed to preliminary discussions regarding research design and corresponding methodologies, as well as training and supervising data analysis procedures. ME-S contributed to the initial design and implementation of the study. All authors engaged in editing the manuscript.

ACKNOWLEDGMENTS

We would like to acknowledge the University of Florida (UF) and Professor Faten Mostafa, Head of Medical Microbiology and Immunology Department, Faculty of Medicine, Ain Shams University (ASU) students who participated in the Virtual Exchange program. We also like to thank UF's International Center for the endless support and resources around virtual exchanges.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.877547/full#supplementary-material

REFERENCES

1. Cohen A, Yemini M, Sadeh E. Web-based analysis of internationalization in Israeli teaching colleges. *J Stud Int Educ.* (2014) 18:23–44. doi: 10.1177/1028315313479131
2. Tanhueco-Nepomuceno L. Internationalization among selected HEIs in the ASEAN region: basis for a proposed framework for an internationalized campus. *Int J Educ Dev.* (2019) 65:152–71. doi: 10.1016/j.ijedudev.2018.07.003
3. Ninnes P, Hellstén M, editors. *Internationalizing Higher Education: Critical Explorations of Pedagogy and Policy*. Dordrecht: Springer Science & Business Media (2005). doi: 10.1007/1-4020-3784-8
4. Appiah-Kubi P, Annan E. A review of a collaborative online international learning. *Int J Eng Pedagogy*. (2020) 10. doi: 10.3991/ijep.v10i1.11678
5. Esche M. Incorporating collaborative online international learning (COIL) into study abroad courses: a training design.
6. Guth S. The COIL Institute for Globally Networked Learning in the Humanities. Final report white paper. *SUNY COIL Center*. (2013) 10:2014.
7. Rubin, J. *Faculty Guide For Collaborative Online International Learning Course Development*. (2015). Available online at: http://www.ufic.ufl.edu/UAP/Forms/COIL_guide.pdf
8. Onosu OG. Cultural immersion: a trigger for transformative learning. *Soc Sci.* (2020) 9:20. doi: 10.3390/socsci9020020
9. O'Dowd R. Virtual exchange: moving forward into the next decade. *Computer Assisted Language Learning.* (2021) 34:209–24. doi: 10.1080/09588221.2021.1902201
10. Rubin J. Embedding collaborative online international learning (COIL) at higher education institutions. *Internationalisation of higher education-A handbook*. (2017) 2:27–44.
11. Johnson DW, Johnson RT, Holubec EJ. *The New Circles of Learning: Cooperation in the Classroom and School*. Alexandria, VA: ASCD (1994).
12. Scager K, Boonstra J, Peeters T, Vulperhorst J, Wiegant F. Collaborative learning in higher education: evoking positive interdependence. *CBE—Life Sciences Education.* (2016) 15:ar69. doi: 10.1187/cbe.16-07-0219
13. Naicker A, Singh E, van Genugten T. Collaborative online international learning (COIL): preparedness and experiences of South African students. *Innovations in Education and Teaching International.* (2021) 1–2. doi: 10.1080/14703297.2021.1895867
14. Chiu TK, Lin TJ, Lonka K. Motivating online learning: the challenges of COVID-19 and beyond. *The Asia-Pacific Edu Res*. (2021) 30:187–90. doi: 10.1007/s40299-021-00566-w
15. Mezirow J. "*An Overview on Transformative Learning*". Lifelong learning. New York, NY: Routledge (2006). p. 40–54.
16. Guth S, Helm F. *SUNY COIL Stevens Initiative Assessment FINAL REPORT* (2017).
17. White DE, Oelke ND, Friesen S. Management of a large qualitative data set: establishing trustworthiness of the data. *Int J Qual Methods.* (2012) 11:244–58. doi: 10.1177/160940691201100305
18. Ravitch SM, Carl NM. *Qualitative research: Bridging the conceptual, theoretical, and methodological*. Thousand Oaks, CA: Sage Publications (2019).
19. Collins SL, Mueller S, Wood EA, Stetten N. Transforming perspectives through virtual exchange: a US-Egypt partnership part 2. *Public Health Front*.
20. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res.* (2005) 15:1277–88. doi: 10.1177/1049732305276687
21. Mayring P. Qualitative content analysis. *Forum: Qualitative Social Research*. (2000) 1. doi: 10.17169/fqs-1.2.1089
22. Mayring P. Qualitative content analysis: theoretical foundation, basic procedures and software solution. (2014). doi: 10.1007/978-94-017-9181-6_13
23. Vaismoradi M, Turunen H, Bondas T. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nurs Health Sci.* (2013) 15:398–405. doi: 10.1111/nhs.12048
24. Assarroudi A, Heshmati Nabavi F, Armat MR, Ebadi A, Vaismoradi M. Directed qualitative content analysis: the description and elaboration of its underpinning methods and data analysis process. *J Res Nurs.* (2018) 23:42–55. doi: 10.1177/1744987117741667

25. Berelson B. *Content Analysis in Communication Research*. (1952) Free Press.
26. Moundridou M, Zalavra E, Papanikolaou K, Tripiniotis A. Collaboratively developing open educational resources for engineering educators in SlideWiki. *iJEP*. (2019) 9:99–116. doi: 10.3991/ijep.v9i2.9959
27. Driscoll MP. *Psychology of Learning For Instruction*. Hoboken, NJ: Allyn & Bacon (1994).
28. Graham CR, Misanchuk M. Computer-mediated learning groups: benefits and challenges to using groupwork in online learning environments. *In Online collaborative learning: Theory and practice*. Hershey, PA: IGI Global (2004). p. 181–202. doi: 10.4018/978-1-59140-174-2.ch008
29. Johnson DW, Johnson RT. Cooperation and the use of technology. In Jonassen DH, editor. *Handbook of research on educational communications and technology*. New York, NY: Lawrence Erlbaum Associates Publishers (2004).
30. Kayumova AR, Sadykova GV. Online collaborative cross-cultural learning. students' perspectives. *Journal of Organizational Culture, Communications and Conflict*. (2016) 20:248.
31. Gemmell I, Harrison R, Clegg J, Reed K. Internationalisation in online distance learning postgraduate education: a case study on student views on learning alongside students from other countries. *Innov Educ Teach Int*. (2015) 52:137–47. doi: 10.1080/14703297.2014.881264
32. Neumeyer X, McKenna A. Entrepreneurial thinking in interdisciplinary student teams. *Adv Eng Educ*. (2016) 5:n1.
33. Bosque-Pérez NA, Klos PZ, Force JE, Waits LP, Cleary K, Rhoades P, et al. pedagogical model for team-based, problem-focused interdisciplinary doctoral education. *Bioscience*. (2016) 66:477–88. doi: 10.1093/biosci/biw042
34. Helm F, Beaven A, editors. *Designing and Implementing Virtual Exchange–a Collection of Case Studies*. Research-publishing net (2020).
35. Kirmayer LJ. Rethinking cultural competence. *Transcult Psychiatry*. (2012 A) 49:149–64. doi: 10.1177/1363461512444673
36. Hook JN. Engaging clients with cultural humility. *J Psychol Christ*. (2014) 33:277–81.
37. Moore-Bembry N. Cultural humility: a life-long transformation. *Reflections: Narratives of Professional Helping*. (2020) 26:4–12.
38. Helm F. Languages and international virtual exchange: Introduction to the special issue. *Eur J Lang Policy*. (2019) 11:139–42. doi: 10.3828/ejlp.2019.9
39. Association of American Colleges and Universities. *Inquiry and Analysis VALUE Rubric*. (2014). Available online at: https://www.aacu.org/value/rubrics/inquiry-analysis

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers | Frontiers in Public Health

CURRICULUM, INSTRUCTION, AND PEDAGOGY
published: 23 May 2022
doi: 10.3389/fpubh.2022.880638

Transforming Perspectives Through Virtual Exchange: A US-Egypt Partnership Part 2

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Specialty section:
This article was submitted to Public Health Education and Promotion, a section of the journal Frontiers in Public Health

Received: 21 February 2022
Accepted: 27 April 2022
Published: 23 May 2022

Citation:
Collins SL, Mueller S, Wood EA and Stetten NE (2022) Transforming Perspectives Through Virtual Exchange: A US-Egypt Partnership Part 2. Front. Public Health 10:880638. doi: 10.3389/fpubh.2022.880638

Collaborative online international learning programs, such as virtual exchange, that utilize telecollaborative activities have been integrated into more classrooms within the higher education setting. These programs provide students exposure to international cultures, perspectives, and ideas is no longer considered "value added", but a prerequisite to entering many workforces. These programmatic objectives compliment Mezirow's Transformative Learning Theory, that substantiates two major elements of transformative learning are critical reflection and dialectical discourse. This study presents the second half of a qualitative inquiry into the prominent themes that arose during a virtual exchange that was conducted in March 2021 between students in the United States (US) enrolled in a global public health course and Egyptian microbiology students. This study sought to expand upon the Transformative Learning Theory through inductive analysis procedures to offer a modernized adaptation of the theoretical framework within international learning environments. Student responses enrolled in an undergraduate global public health course were collected and analyzed by two coders using inductive/open coding to identify salient codes. These codes were then summarized into categories and subsequently defined. Resulting themes include Connectedness, Openness, Acquisition of Knowledge and Skills, Communication, Cultural Identity, Anticipation of Options for New Roles, Relationships, and Actions, and Absence of Change. Several themes have corresponding categories and subcategories. Adult learning environments such as the modern college classroom have changed with the introduction and reliance upon online learning domains, as well as the diversification of higher education student demographics, accentuating the need to inductively analyze student learning processes and outcomes. In doing so, our findings provide a modernized adaptation of the Transformative Learning Theory that allows for adult learning theorists, researchers, and scholars to integrate tenets of transformative learning more appropriately. As such, this provides an opportunity for educators to coalesce the identified mechanisms (e.g., openness, cultural background, anticipation of roles and relationships) to bolster student's willingness and ability to engage in transformative

critical reflections. By capitalizing on students' innate characteristics, such as open-mindedness predispositions and cultural background, educators are able to augment transformative learning strategies through tailored assignments and course activities.

Keywords: virtual exchange, global learning, transformative learning, collaborative online international learning, qualitative

INTRODUCTION

Collaborative online international learning, or COIL, has been integrated into more classrooms in higher education to advance areas around intercultural competence as well as to improve dialogue and digital literacy skills through telecollaboration (among other methods). COIL, often referred to by other monikers such as virtual exchange, is a strategy employed initially by foreign language instructors and in business classes to bolster international collaborations (1–4). Within the contexts of this study, we chose the broader term Virtual Exchange (VE) to describe the series of telecollaborative activities that were implemented in the classroom. To provide students exposure to international cultures, perspectives, and ideas is no longer considered "value added", but a prerequisite to entering many workforces (5–7). Implementing elements of COIL can be done within the classroom or through other mechanisms, such as student organizations or as a program requirement. Internationalization, especially during the time of the COVID-19 pandemic, has reinforced the importance of integrating intercultural competence within courses to prepare students for diverse societies (6).

Intercultural competence, a common principle within VE research, has been defined in several ways but most definitions include four constructs that are measured and/or included within implementation (6, 8–11). These constructs (attitudes, knowledge, skills, and behaviors) contribute to the students' overall understanding of self, having the agency to want to discover or explore the unknown, and similar to concepts within cosmopolitanism (12), going beyond one's own perspective and self (13–15). Facilitating factors within intercultural competence include a more immersive experience when learning about course content than many traditional teaching formats (6, 7, 16). Interacting with international peers directly, through a virtual modality, students create the opportunity to better understand complex dynamics through their own lived experiences (17). While most pedagogical approaches to increasing intercultural competence include mobility, which may include study abroad, financial constraints and time often limit students from engaging in these activities (6, 16, 18). Moreover, with less than ten percent of undergraduate students in the United States participating in study abroad, it does not appear to be the most pragmatic approach to addressing intercultural competence (6, 19). While VE can be applied to most if not all disciplines, the students' lack of awareness of their international peers' local language can have a deleterious impact on overall student learning outcomes through breakdowns in communications, misunderstanding expectations of presented tasks, and differing interpretations of how to problem solve (16, 20–23). Without offering students the opportunity to reflect on how diverse perspectives catalyze varying interpretations, there can be no reconciliation (24–27). For example, resolving issues around time differences is common among VE programs and does not necessarily create resentment or negative feelings. This is especially important as we review and make recommendations for Mezirow's Transformative Learning Theory (TLT) (28) around students feeling shame, regret, or other negatively charged feelings within the VE.

Transformative Learning Theory

The TLT is a critical adult learning theory grounded in the belief that "learning is understood as the process of using prior interpretation to construe a new or revised interpretation of the mean of one's experience in order to guide future action" (29). Mezirow (29) further elaborates individuals make sense of ideas and communicate through their frame of reference, which is composed of meaning perspectives and meaning schemes. Meaning perspectives are considered to be broad and orienting predispositions whereas the meaning scheme is a group of beliefs, feelings, attitudes, and judgements that place meaning or shape a specific interpretation. Within the TLT lens, learning occurs by elaborating on existing meaning schemes, learning new meaning schemes, or transforming meaning schemes (29). The mechanisms by which these occur are through either instrumental or communicative learning. Instrumental learning depicts the idea of seeing a cause and effective relationship, whereas communicative learning is the process of deciphering what the intended meaning or feeling others are expressing when others communicate with us.

The TLT is thought to occur in a stage-base cyclical process, originally constructed from Mezirow and Marsick's research on re-entry of women into college programs (30, 31). The most recent revision of the conceptualization of the TLT was published in 2006 (28). However, throughout each revision of the TLT, it has maintained the stage-based cyclical process and has been employed within modern research efforts such as Sharpe's work on enabling behavior change for adaptation and resilience to disaster threats using the TLT (32). The visual depiction of Mezirow's (28) TLT can be found in **Figure 1**.

Mezirow's recent work substantiates that the two major elements of transformative learning are critical reflection and dialectical discourse (28). The VE described in this study sought to provide opportunities to both critically reflect and engage in dialectical discourse with various international parties. This study is the second half of a qualitative inquiry into the

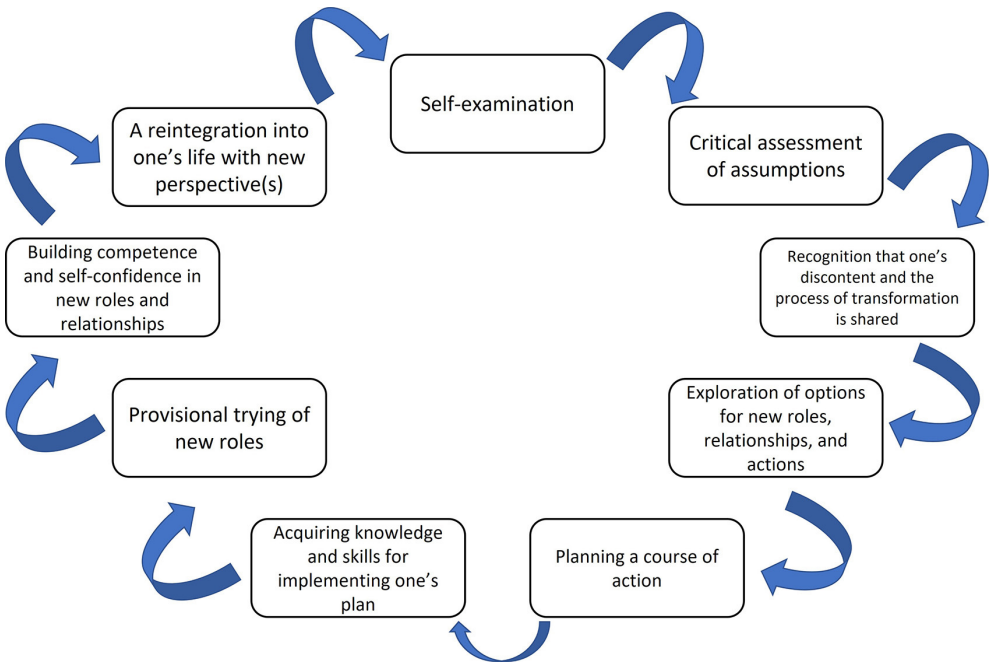

FIGURE 1 | Interpretation of Mezirow's transformative learning theory.

prominent themes that arose during a VE that was conducted in March 2021 between students in the United States (US) enrolled in a global public health course and Egyptian students enrolled in a microbiology course. The prequel to this study (33) presents the manner in which students validated Mezirow's TLT (28) through deductive classification in the existing stages. In contrast, this study sought to expand upon the TLT (28) through inductive analysis procedures. Evidence suggests that adult learning environments such as the modern college classroom have changed with the introduction and reliance upon online learning domains (34, 35), as well as the diversification of higher education student demographics (36, 37), thus accentuating the need to inductively analyze student learning processes and outcomes that allow for salient themes that provide an expansion of learning theories that were developed in a different learning era.

METHODS

Data Collection

University of Florida (UF) students enrolled in PHC3440: Global Public Health participated in a 5-week Virtual Exchange (VE) with students from Ain Shams University (ASU) in Cairo, Egypt in Spring 2021. The VE experience was accompanied by a series of reflection-based assignments, collective which were referred to as the Global Learning Experience (GLE) within the course. More specifically, students responded to an adapted version of the State University of New York's COIL Stevens Initiative assessment (38), as well as a comprehensive Individual Analysis Paper (IAP), resulting in four time points of data collection. A more comprehensive overview of the operationalization of the GLE (33), as well as the programmatic structure (**Appendix A**) have been described elsewhere. A total of 108 UF students engaged in reflection-based assignments throughout the GLE.

Upon semester completion, the course instructor exported and de-identified student submissions, providing each student with a unique code to indicate their reported sex, race/ethnicity and a randomly selected number. The research team stratified students according to reported sex and found that only 11 students reported being male. In an effort to ensure male participants were included in analysis, the research team conducted a 2:1 match sampling procedure based on each male's reported race/ethnicity. Therefore, reportedly female respondents were stratified according to their reported race/ethnicity and randomly selected until the 2:1 quota was met. This was conducted to ensure a representative and appropriately sized sample. Once selected, student responses to the four reflection-based assignments were collected. Students were excluded from the final sample if they did not complete all assignments or whose responses were severely lacking in addressing the assignment prompt. This resulted in the final sample of 28 students.

The student responses were organized by each time point and responses were collated according to the assessment item. For example, the first reflection-based assignment had four items. All responses to item one were collated on one document. Student responses were labeled corresponding to their unique code. More details regarding the data collection and sampling approach can be found in Part 1 (33). The UF Institutional Review Board approved this study (IRB#: IRB202003293).

Data Analysis

Student responses were analyzed using inductive and directed content approaches. The researchers used Mezirow's TLT as the guiding theoretical framework to conduct directed content analysis, which specifically seeks to expand upon or validate an existing framework (39). The results of the directed content analysis are published in Part 1 (33), with this paper focusing solely on inductive results. For codes that did not fit into the predetermined themes (constructs within Mezirow's TLT), inductive/open coding was used to identify salient codes. These codes were then summarized into categories and subsequently defined (39). Some themes contain categories and subcategories that provide a more specific phenomenon.

Two coders first independently conducted analysis procedures, hand coding line-by-line. Upon the conclusion of open coding, like-codes were grouped and labeled to develop a new category (40). Negotiations between the two coders were performed after each data set from the different time points was completed. During each negotiation, the researchers redefined the operational definitions based upon the findings and re-coded, line-by-line, until they reached complete agreement. Following the completion of the IAP data analysis negotiation, the researchers revisited all data to ensure continued fit to the finalized category operational definitions.

Content analysis procedures not only provide a systematic approach to describing phenomena, but also a means to quantifying such phenomena (41). The frequencies of each theme were calculated upon the conclusion of data analysis. Themes were only counted once per student response per item, despite the frequency of presentation. Some student responses contain more than one theme.

RESULTS

A total of 28 students were selected for the sample to represent the 108 undergraduate students partaking in the GLE program. These students were majority female and comprised a diverse cultural and ethnic group including White, Non-Hispanic, White-Hispanic, Black, Asian, and two or more races. The final themes, categories and subcategories and their respective operational definitions can be found in **Table 1**. Frequencies are presented in **Table 2**. Results are presented in order of prevalence.

Connectedness

Connectedness was divided into two categories: (1) Relatedness and (2) Friendship. Relatedness was the most frequently demonstrated construct throughout the VE. This theme and its categories were equitably distributed across all four timepoints. Characterized by students' appreciation toward the exchange of information, students described "how important different perspectives are when addressing global public health issues. It is completely unhelpful to study global public health issues in a vacuum, as there will always be another perspective that adds valuable information to creating a solution." Students shared a mutual understanding with their Egyptian peers as demonstrated here where a student writes, "It seems that there is a sub-category for people that come from countries outside of the US and it allows me to feel comfortable being able to interact with people who also are not originally from the US."

Relatedness

In most cases, students found themselves more similar to their Egyptian counterparts than expected, "Our similarities are much greater than our differences." As the exchange was centered on the COVID-19 pandemic, students would compare their governments' COVID-19 responses, "I did learn that our governments dealt with COVID-19 in a similar fashion." In addition to the government response, students found similarities in personal circumstances as well, "They have kind of the same hopes/fears about the pandemic and that our responses weren't so different. An example of this is how their university shifted its curriculum, however, it was different in that they had projects but still similar in that all their classes went online." Students went further than finding a common background to enhance understanding, but similar cultural circumstances lent themselves to creating more substantial relationships and conversation. One student said, "Most times when I come across someone who is not originally from the United States, I find that I am able to relate to them more easily and have a better time connecting because immigrant ideals tend to be pretty similar in certain aspects." Identification and acknowledgment of this shared history or experience was a key component in Relatedness.

Friendship

Students admitted to hoping that they would "make some friends" during the exchange. Admittedly, some students were disappointed at the end of the exchange that they did not get to experience more of these interactions. Students appreciated informal interactions examining each others' social lives such as "When I shared that I am a professional musician who has a YouTube channel, they were quick to check out my content and were so loving and encouraging." This also demonstrated the receptiveness and active engagement from both parties.

Openness

Openness followed Relatedness in frequency. This theme was divided into two categories: openness to (1) global and cultural perspective and (2) public health perspective. Prior to the exchange, students would express what they hoped to gain such as, "I hope to meet new people and be able to learn about their lives...I want [to] be a little less ignorant walking away from this experience." Some students' personal experiences served as a motivator of remaining open and accepting of their peers. For example, "I do not like when people make assumptions about me, so I keep an open mind when talking to people from a different background than me." During the latter half of the VE, students recognized the value of openness as a result of their interactions. One student admitted, "This course has taught me the importance of being open-minded and willing to participate."

Global and Cultural Perspective

This Openness category depicts a specific willingness or opportunity to develop or expand worldly and Egyptian cultural knowledge, understanding, and skills. This was most frequently

TABLE 1 | Finalized themes, categories, and sub-categories.

Themes	Categories (If applicable)	Sub-categories (If applicable)	Operational definitions
Connectedness			Contextualizing the depth and breadth of personal and professional linkages across people and populations and the international flow of ideas.
	Relatedness		Situating one's self and country/culture in relation to international partners and objectively identifying and examining similarities and differences.
	Friendship		Informal social relationships in which one engages in subjective, "fun", pleasant interactions with others.
Openness			An objective expression of one's willingness and/or present opportunity to grow knowledge, understanding, and/or skills based upon this collaborative online experience. In addition, a perceived willingness from international partners to share and engage in open conversations.
	Global & health perspective		A specific willingness or opportunity to develop or expand worldly and Egyptian cultural knowledge, understanding, and skills (i.e., values, beliefs, priorities), but specifically not related to public health. In addition, a perceived willingness of Egyptian students to expand or develop American perspectives.
	Public health perspective		A specific willingness or opportunity to develop and expand an awareness on Egyptian and global public health. In addition, a perceived willingness of Egyptian students to expand or develop American public health perspectives.
Acquisition of knowledge and skills			A noted [passive] statement of one's engagement in the ongoing process of procuring and developing knowledge and skills through international relationships.
	Acquire and institutionalize cultural knowledge and skills		A noted [passive] statement of one's engagement in the ongoing process of procuring and developing both intercultural and intracultural knowledge and skills. This is a foundational step in developing cultural competence.
	Acquire and institutionalize public health knowledge and skills		A noted [passive] statement of one's engagement in the ongoing process of procuring and developing both intercultural and intracultural public health knowledge and skills.
Communication			Encompasses any explicit mention of one's ability to dialogue and converse with partners to achieve PHC3440 objectives.
	Difficulties in communication		A mention of barriers that impeded communication efforts between international partners.
		Challenges in virtual exchange communication channels	A specific description of logistical difficulties such as internet connection, online communication platforms, time, etc. that hindered one's ability to communicate effectively with partners, potentially causing discourse.
		Challenges in communication due to language barrier	A specific description of language barriers including formality and comprehensibility of terms, phrases, etc. that hindered effective communication with partners, potentially causing discourse.
	Successful communication		A specific mention of positive experiences and mechanisms to dialogue with partners.
Cultural identity			A portion of one's sense of self that derives from their racial and ethnic origins, practiced traditions, and/or values and beliefs.
	Multicultural		Self-identified cultural background originating from more than one racial and ethnic origins, practiced traditions, and/or values and beliefs that influences one's sense of being.
		Manifestation of multicultural identity	A personal description of one's values, traditions, and identity that depicts a differential boundary between two cultural backgrounds and their interactions with one another.
	Monocultural		Self-identified cultural background originating from one racial and ethnic origin, practiced tradition, and/or values and beliefs that influence one's sense of being.
	Manifestation of cross-cultural interactions		Expressed understanding of, feelings toward, or appreciation for international persons based upon the participants cultural background and identity.

(Continued)

TABLE 1 | Continued

Themes	Categories (If applicable)	Sub-categories (If applicable)	Operational definitions
Anticipation of options for new roles, relationships, and actions			Participant preemptively contemplates opportunities to integrate and apply new [assumptions] *via* personal identity, interactions, and personal behaviors based on PHC3440 course structure.
Absence of change			An explicit statement from the participant claiming that they believe they will not have (pre) OR have had little to no shift/change in perspective or assumptions (mid-, post-, IAP).

TABLE 2 | Frequency of themes, categories, and sub-categories.

Themes	Categories (If applicable)	Sub-categories (If applicable)	Data collection round				
			Pre-VE	Mid-VE	Post-VE	IAP	Total
Connectedness			16	5	10	12	**43**
	Relatedness		15	40	37	24	**116**
	Friendship		8	6	1	4	**19**
Openness			21	24	14	4	**73**
	Global & health perspective		31	8	13	6	**58**
	Public health perspective		27	0	7	2	**36**
Acquisition of knowledge and skills			3	7	17	8	**35**
	Acquire and institutionalize cultural knowledge and skills		1	11	5	12	**29**
	Acquire and institutionalize public health knowledge and skills		0	14	24	24	**62**
Communication			0	0	0	0	**0**
	Difficulties in communication		0	2	7	3	**12**
		Challenges in virtual exchange communication channels	0	6	22	25	**53**
		Challenges in communication due to language barrier	0	2	0	5	**7**
	Successful communication		0	17	13	28	**58**
Cultural identity			1	0	7	16	**24**
	Multicultural		18	6	3	6	**33**
		Manifestation of multicultural identity	6	1	3	12	**22**
	Monocultural		7	7	4	6	**24**
	Manifestation of cross- cultural interactions		5	11	7	6	**29**
Anticipation of options for new roles, relationships, and actions			16	3	1	1	**21**
Absence of change			3	6	6	5	**20**

demonstrated prior to the VE. As one student said, "Overall, what I want from this virtual exchange experience is to take a deep dive into another culture."

Public Health Perspective

The second category of Openness encapsulated a willingness to develop or expand an awareness of Egyptian and global public health. Students anticipated the exchange enhancing their public health knowledge and ability to address public health needs with frequency piquing during the pre-VE timepoint. For example, "The interactions I have with these students will impact my learning in this course as it will place a greater emphasis on understanding how culture can impact public health interventions" and "I would want to further explore public health responses in other countries to see what they do better and worse."

Acquisition of Knowledge and Skills

Acquisition of Knowledge and Skills was divided into two categories relating to Cultural Knowledge and Skills and Public Health Knowledge and Skills. Students recognized different perspectives (knowledge) which, "created a new dimension to consider when creating policy…there are no rights or wrongs, simply different but equally relevant approaches to the same problem." Any time students admitted to learning something new *via* a passive interaction, thereby not specifically asking questions or researching, this was defined as the acquisition of knowledge and skills.

Acquire and Institutionalize Cultural Knowledge and Skills

The acquisition of knowledge and skills in relation to institutionalizing cultural knowledge was a noted [passive] statement of one's engagement in the ongoing process of procuring and developing both intercultural and intracultural knowledge and skills. In these instances, students explicitly described passive "learn[ing] a lot about their culture, values, and their country as a whole."

Acquire and Institutionalize Public Health Knowledge and Skills

This category illustrates one's engagement in the ongoing process of procuring and developing both intercultural and intracultural public health knowledge and skills, and followed Openness in frequency. Students would relate what they learned through conversing with their peers to their curriculum and current understanding of public health. For example, one student said, "Working with students in another country has helped me to get a better insight into the quality and status of public health in a country I was previously unfamiliar with. It has also allowed me to view the systems we have in place in the United States with a more critical eye and with more appreciation simultaneously." Many students echoed this sentiment and further added that learning from the textbook is not sufficient when they could gain "inside access to another country's public health issues from those who experience it themselves."

Communication

Regarding the VE, students were asked about their ability to communicate with their Egyptian counterparts. Different facets of communication were divided into categories including difficulties in communication and successful communication.

Difficulties in Communication

Difficulties in communication included a mention of barriers that impeded communication efforts between international partners. Often, this would present as social anxieties. A few students mentioned worry in conversing such as, "I think this experience was stressful when I was first encountering the international students. I was very fearful that I would unintentionally offend them or lack commonality." Frequently, challenges revolved around communication channels such as, "The time difference between Florida and Cairo was definitely a barrier in this project." These channel-communication barriers also included the unreliability of communication apps and learning management systems (e.g, WhatsApp, Canvas, and Zoom. Concerns over Egyptian students' knowledge of programs like Google Docs or Google Slides were expressed, as well as issues pertaining to video conference connectivity.

Another challenge was language and English dialect. For example, "The Egyptian students were very advanced in their English, but there was still a barrier at times with them fully understanding complicated phrases and words." It is notable that while these challenges were evident, most students followed up these statements with an ability to adapt and overcome the issue.

Successful Communication

Contrary to difficulties in communication and, noted almost as frequently, was successful communication. This was defined as a specific mention of positive experiences and mechanisms to dialogue with partners. Many students enjoyed the ability to converse with various apps such as Whatsapp. Both Egyptian and American students were receptive to the exchange platform, with many American students providing feedback such as "My partners from Egypt have been very amiable and easy to communicate with."

Cultural Identity

Students were asked to define their own cultural identity in response to the prompts. These responses were categorized as multicultural, or monocultural, and manifestation of cross-cultural interactions. Being aware of their own cultural background and experiences "really does impact the way they view the world." For example, "there are a lot of differences between my parents' views of the world and a lot of American-born people. I really like this because I think that these differences allow me to create a more complete view of the world rather than a one-sided one."

Multicultural

Student responses were coded as multicultural when they self-identified their cultural background as originating from more than one ethnicity or race that influences one's values, traditions, and sense of being. Examples included American and Korean and Pakistani-American. One student identified them self as diverse, "As a biracial, first generation American, my cultural background is diverse." Students also elaborated on how these two or more identities would manifest, whether in tandem or contrasting, resulting in the sub-category, manifestation of multicultural identity. For example, "I have also struggled with my identity as a Latina in America because of the inability to entirely fit in either American or Latinx spaces."

Monocultural

Students who identified as monocultural, self-identified their cultural background as originating from one ethnicity or race that influences one's values, traditions, and sense of being. Numerous students classified themselves as American. For example, "Going into this experience, I would describe my cultural background as very much American." But monocultural was not limited to

this and another student added, "My cultural background is of Haitian descent."

Manifestation of Cross-Cultural Interactions

In addition to cultural background self-identification, students examined the influence of their cultural background on their interactions through expressed understanding of, feelings toward, identify with, or appreciation for international partners based upon the participants cultural background and identity. Individuals described being more sensitive to cultural nuances due to their acknowledgment of their own cultural background. For example, "I think my background influenced my understanding of how to collaborate with students abroad by helping me to not put people into categories." Students explained that their own cultural background facilitated an environment of respect, understanding, and openness. One student explained, "I respect people's culture just as I want others to respect my culture…my background has influenced me to think a certain way but respect people's opinion other than my own. This allows me to understand why people do a certain thing even when I do not agree with it." This discussion demonstrated some internal reflection from students, fostering greater relationships with their peers.

Anticipation of Options for New Roles, Relationships, and Actions

Prior to the VE, and during limited occurrences throughout, students would anticipate their options for new roles, relationships, and actions. The expression of this theme often involved the ability to apply course content or information gleaned from the VE in the future. Before the exchange, students described how they would use new information, "I want to take this perspective into my future career as a physician and treat my future patients from other cultures with personalized care in light of their cultural preferences, ensuring their sense of comfortability."

Absence of Change

This theme occurred throughout all four timepoints, although rarely. Students would explicitly mention that they did not anticipate any change in attitudes nor did not recognize any change after the fact. For example, "I do not think I experienced any strong changes in how I view the world." Many students who noted this theme, did follow this statement with a "However," clause indicating some change, although they may not have explicitly identified or acknowledged it.

DISCUSSION

Global Learning Experience (GLE) programs offer telecollaborative, immersive activities that provide students with exposure to international cultures, which has now become a prerequisite for many careers (5–7). One of the instructional goals within GLE is to increase intercultural competence, which ultimately seeks to contribute to a student's understanding of self, increase their sense of agency to discourse or explore foreign ideas or principles, and transcending one's own perspective and self (13–15). These GLE aims complement Mezirow's TLT, which specifically posits that learning occurs by elaborating on, learning new, or transforming existing attitudes, beliefs, and understandings of a phenomenon (29). This study sought to implement a GLE program in an undergraduate global public health course grounded in the TLT, using student assignments as a means to validate, expand, or offer a critique of the current TLT through qualitative, inductive methodologies.

Part 1 of this study demonstrates the manner in which students' perspective-taking, self-awareness, and critical reflections coincided with Mezirow's TLT (28). In contrast, this study sought to explore how students' learning processes deviated from Mezirow's TLT. It is essential to openly analyze student learning experiences, as the original TLT was developed during a vastly different era - when women were just starting to enter collegiate domains (30). In contrast, today's higher education student make-up continues to diversify (36, 37), while learning domains and platforms transform as the digital age continues to evolve (34, 35). Therefore, a revised interpretation of the TLT conceptual framework is provided within **Figure 2** that integrates our inductive findings.

Our findings demonstrate that the TLT may be vulnerable to a student's preemptive beliefs about the value of or excitement toward a disorienting dilemma. For example, "Openness" was the second most prominent theme and we found that students who were more open in the pre-GLE assessment were more likely to enter into the cycle of TLT. However, those that reported they believed no change would occur often cited an experience of an absence of change, thus demonstrating a potential influence of their preemptive mindset. This is not surprising considering Mezirow's (42) claim that one's critical self-reflection is more likely to be emancipatory when met with ideal learning conditions, one being openness to alternative perspectives. However, the prevalence of students' openness toward this learning experience may illustrate that the current TLT underestimates the influence of one's origin mindset. Therefore, one's openness may be more appropriately considered as a gatekeeping mechanism that serves as an enabler or inhibitor to one engaging in critical self-reflection rather than strictly as an ideal condition (42). We found that upon the conclusion of the GLE students reported having attained openness as a skill. Similarly, others have found that exposure to collaborative learning opportunities increases one's openness to diversity (43). This increase in openness to diversity likely perpetuates one's excitement for more opportunities/disorienting dilemmas that present alternative perspectives that challenge an individual's presuppositions.

Within our findings, that value of "Connectedness" was emphasized by one of its subthemes, "Relatedness," being the most frequent theme identified within student responses. This coincides with existing literature that demonstrates global connectedness can be enhanced through curricular opportunities that engage in cross-cultural dialogue and contexts within higher education settings (44). Students reported a high degree of relatedness, indicating that they were more similar to their international counterparts than originally thought. This is likely exacerbated within a Euro-American

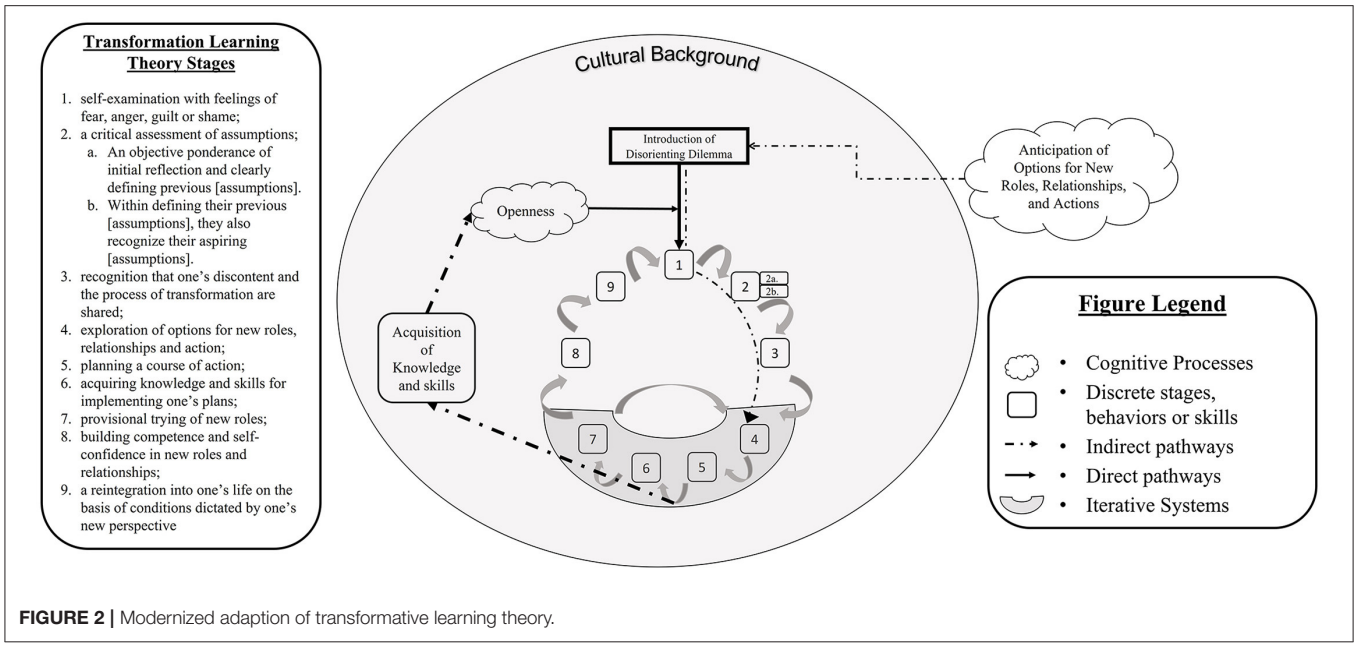

FIGURE 2 | Modernized adaption of transformative learning theory.

cultural context that situates otherness as a central tenet within our individualized identities (45, 46). Combatting this principle of otherness through the GLE allows for students to identify similarities rather than emphasizing differences, thus mechanizing critical reflection and rebuilding meaning schemes for one to operate within in future educational and occupational endeavors. However, not all cases of relatedness were presented in terms of a surprise. Several students indicated feeling closer to the Egyptian students than their American peers based on their cultural background. Existing literature cites that acculturation processes often accompany international students (47), non-traditional students such as veterans (48), and students with immigrant background (49). Consequently, students with reported multi-cultural backgrounds may have already endured acculturation processes that allow them to relate more closely with international partners than their American peers. These acculturation processes often require that students engage in self-identification to assess their sense of belongingness, centrality to the major culture, and traditions that may coincide or deviate from major culture norms (50). This can ultimately be thought to prime students to have a higher degree of cultural awareness than students who have had the privilege of innately belonging to the majority culture within higher education. Therefore, cultural background should be considered when assessing one's degree of transformational learning.

"Openness" and "Connectedness" presented new mechanisms which facilitated transformational learning. In contrast, "Acquisition of knowledge and skills" and "Anticipation of Options for New Roles, Relationships, and Actions" can be seen as accompanying steps within the TLT conceptual framework rather than as separate or substantial pathways for transformative learning. By assessing students before the onset of the disorienting dilemma (VE), students preemptively contemplated options for new roles, relationships, and behaviors that were eventually revisited within the traditional TLT stage four, "Exploration of options for new roles, relationships and action" (33). Therefore, allowing students to contemplate potential uses for altering their preconceived notions may encourage openness and increase the likelihood for these new options to be realized. In addition to these new mechanisms, we identified that the traditional TLT steps four through seven (33), may offer a separate iterative process within the larger transformational learning cycle. Students showed that after provisionally trying new roles, they often revisited exploring new options if something did not work out. This is intuitive as the "provisional" trying of new roles suggests a troubleshooting mechanism. However, within this iterative process, students reported acquiring and institutionalizing new skills and behaviors in a more implicit manner. These implicit indications were categorized under the "Acquisition of knowledge and skills" because these skills may be unrelated to the transformation of their previous assumptions, but rather allow for skills such as open-mindedness, that will benefit students in future opportunities of transformative learning.

Despite an overwhelming number of students acknowledging the benefits of VE, there were frustrations expressed by students around communication Many students discussed having international partners who were attentive and interacted regularly, while, other students described situations where their partners were unresponsive, causing them stress and/or anxiety due to upcoming assignments. Guth and Helm (38) address issues around communication through stating explicit meeting times that are negotiated beforehand and working with students on larger communication dynamics. Contrary to literature recommending more training in online communication (51), due to the COVID-19 pandemic, students internationally were sprung into online settings that afforded them the ability to

improve their digital literacy skills. In fact, by offering the students more than one online modality to communicate, students felt more in control of their assignments and activities within the module, which was emphasized in previous literature (52, 53). As most studies around VE have underscored already, the use of online technology in promoting collaborative learning is essential in its success (54, 55). Technology-supported environments for social interactions and experiential learning can foster reimagined pedagogical approaches to teaching course content (55). This is especially relevant as the COVID-19 pandemic has catalyzed more momentum for online learning, cultivating digital skills, and addressing social equity issues around international travel (55, 56).

This study allows for scholars to integrate a modernized version of Mezirow's TLT (28), that accounts for the influence of the digital age on learning environments, as well as the diversification of students in higher education. As such, this provides an opportunity for educators to coalesce the identified mechanisms (e.g., openness, cultural background, anticipation of roles and relationships) to bolster student's willingness and ability to engage in transformative critical reflections. By capitalizing on students' innate characteristics, educators are able to augment transformative learning strategies through tailored assignments and course activities.

LIMITATIONS

Limitations in this study consisted of data collection methods and generalizability. The data collection followed a structured format, which did not allow for further exploration of prominent inductive themes or ideas. Furthermore, though content analysis was the most appropriate qualitative coding methodology for this study, it is limited in drawing relationality between salient themes, which may have been useful when critiquing an interdependent stage-based learning framework. This study may have benefited from data triangulation such as interviews or focus groups after the conclusion of the exchange to support richer responses that may have proven beneficial in identifying the subtle changes along the transformative learning cycle.

Regarding generalizability, this VE only evaluated the impact on American students at one public university, and did not evaluate the impact on Egyptian students in this paper. Future work could examine both sides of the partnership of the VE to determine if any change was reciprocal.

DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: https://original-ufdc.uflib.ufl.edu/IR00011740/00001.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Florida Institutional Review Board (IRB#: IRB202003293). Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

AUTHOR CONTRIBUTIONS

SC contributed to preliminary discussions regarding research design and corresponding methodologies, conducted data analysis procedures, wrote the pedagogical theory, results, and discussion sections of this manuscript. SM conducted data analysis procedures and wrote the results and limitations sections of this manuscript. EW contributed to preliminary discussions regarding research design and corresponding methodologies, collected data, and wrote the introduction section of this manuscript. NS contributed to preliminary discussions regarding research design and corresponding methodologies, as well as training and supervising data analysis procedures. All authors engaged in editing the manuscript. All authors contributed to the article and approved the submitted version.

ACKNOWLEDGMENTS

We would like to acknowledge the University of Florida (UF) and Ain Shams University (ASU) students who participated in the Virtual Exchange program. We'd also like to thank Dr. Mona El Shokry, Prof. of Microbiology at ASU, as well as UF's International Center for the endless support and resources around virtual exchanges.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.880638/full#supplementary-material

REFERENCES

1. Cummins J, Sayers D. *Brave New Schools: Challenging Cultural Illiteracy Through Global Learning Networks*. Palgrave Macmillan. (1997).
2. Warschauer M. *Telecollaboration in Foreign Language Learning: Proceedings of the Hawaii Symposium*. Natl Foreign Lg Resource Ctr. (1996).
3. O'Dowd R, Lewis T. *Online Intercultural Exchange: Policy, Pedagogy, Practice*. Routledge. (2016). doi: 10.4324/9781315678931
4. O'Dowd R. From telecollaboration to virtual exchange: State-of-the-art and the role of UNICollaboration in moving forward. *Res Publish net*. (2018) 1:1–23. doi: 10.14705/rpnet.2018.jve.1
5. Wyburd J. Transnational graduates and employability: challenges for HE language departments. *Innov Langu Teach Learn Univ*. (2017) 21:11–9. doi: 10.14705/rpnet.2017.innoconf2016.650
6. Verzella M. Virtual exchange between cross-cultural teams: a sustainable path to the internationalization of college courses. *Transform Dialo Teach. Learn. J*. (2018) 11:1–13.
7. Hauck M. Virtual exchange for (critical) digital literacy skills development. *Eur J Lang Policy*. (2019) 11:187–210. doi: 10.3828/ejlp.2019.12
8. Hammer MR, Bennett MJ, Wiseman R. Measuring intercultural sensitivity: The intercultural development inventory. *Int J Intercult Relat*. (2003) 27:421–43. doi: 10.1016/S0147-1767(03)00032-4

9. Lewis T, O'Dowd RO. Online intercultural exchange and foreign language learning: a systematic review. *Online Intercult Exch.* (2016) 31:35–80.
10. Avgousti MI. Intercultural communicative competence and online exchanges: a systematic review. *Comput Assist Lang Learn.* (2018) 31:819–53. doi: 10.1080/09588221.2018.1455713
11. Perry LB, Southwell L. Developing intercultural understanding and skills: Models and approaches. *Intercult Educ.* (2011) 22:453–66. doi: 10.1080/14675986.2011.644948
12. Corpus Ong J. The cosmopolitan continuum: Locating cosmopolitanism in media and cultural studies. *Media, Cult Soc.* (2009) 31:449–66. doi: 10.1177/0163443709102716
13. Mansilla VB, Jackson A. *Educating For Global Competence: Preparing Our Youth to Engage the World*. New York: Asia Society. (2011).
14. Deardorff DK. Intercultural competence in the 21st century: perspectives, issues, application. *Creat Cult Syner.* (2012) 7–23.
15. Kreikemeier A, James C. Commenting across difference: youth dialogue in an intercultural virtual exchange program. *Digit Cult Educ.* (2018) 1:10.
16. O'Dowd R, Dooly M. Intercultural communicative competence development through telecollaboration and virtual exchange. In *The Routledge Handbook of Language and Intercultural Communication.* Routledge. (2020). pp. 361–375. doi: 10.4324/9781003036210-28
17. Dooly MA. Crossing the intercultural borders into 3rd space culture (s): implications for teacher education in the twenty-first century. *Lang Intercult. Commun.* (2011) 11:319–37. doi: 10.1080/14708477.2011.599390
18. Kommers S, Bista K. *Inequalities in Study Abroad and Student Mobility: Navigating Challenges and Future Directions.* Routledge. (2020). doi: 10.4324/9780367855130
19. NAFSA: Association of International Educators. Trends in U.S. Study Abroad. NAFSA; Available online at: https://www.nafsa.org/policy-and-advocacy/policy-resources/trends-us-study-abroad (accessed February 7, 2022).
20. O'Dowd R. Understanding the "other side": Intercultural learning in a Spanish-English e-mail exchange. *Lang Learn Technol.* (2003) 7:118–44.
21. Marti NM, Fernández SS. Telecollaboration and sociopragmatic awareness in the foreign language classroom. *Innovat Lang Learn Teach.* (2016) 10:34–48. doi: 10.1080/17501229.2016.1138577
22. Yang YF. Learner interpretations of shared space in multilateral English blogging. *Lang Learn Technol.* (2011) 15:122–46.
23. Chase M, Macfadyen L, Reeder K, Roche J, Reeder K, Roche J. Intercultural challenges in networked learning: hard technologies meet soft skills hard technologies meet soft skills. 7.
24. Goodfellow R, Hewling A. Reconceptualising culture in virtual learning environments: From an 'essentialist' to a 'negotiated' perspective. *E-Learn Dig Media.* (2005) 2:355–67. doi: 10.2304/elea.2005.2.4.355
25. Burbules NC. Rethinking dialogue in networked spaces. Cultural studies? *Crit Methodol.* (2006) 6:107–22. doi: 10.1177/1532708605282817
26. De Nooy J. Border patrol in the borderless world: Negotiating intercultural internet discussion. *Lang, Soc Cult.* (2006) 1:1–8.
27. Helm F. *Emerging Identities in Virtual Exchange*. Research-publishing. net; (2018). doi: 10.14705/rpnet.2018.25.9782490057191
28. Mezirow J. *An Overview on Transformative Learning.* Lifelong learning. Routledge: (2006). p. 40–54.
29. Mezirow J. Contemporary paradigms of learning. *Adult Educ Quart.* (1996) 46:158–72. doi: 10.1177/074171369604600303
30. Mezirow J, Marsick V. Education for perspective transformation. Women's re-entry programs in community colleges. (1978).
31. Mezirow J. A critical theory of adult learning and education. *Adult Educ.* (1981) 32:3–24. doi: 10.1177/074171368103200101
32. Sharpe J. Understanding and unlocking transformative learning as a method for enabling behaviour change for adaptation and resilience to disaster threats. *Int J Disast Risk Reduct.* (2016) 17:213–9. doi: 10.1016/j.ijdrr.2016.04.014
33. Wood EA, Collins SL, Mueller S, Stetten NE, El-Shokry M. Transforming perspectives through virtual exchange: a US-egypt partnership part 1. *Front Public Health.* (2022) 10:1–9. doi: 10.3389/fpubh.2022.877547
34. Selwyn N, Gorard S, Furlong J. *Adult Learning in the Digital Age: Information Technology and the Learning Society.* Routledge (2006). doi: 10.4324/9780203003039
35. Cheng HN, Liu Z, Sun J, Liu S, Yang Z. Unfolding online learning behavioral patterns and their temporal changes of college students in SPOCs. *Interact Learn Environ.* (2017) 25:176–88. doi: 10.1080/10494820.2016.1276082
36. Anderson EL. Changing US demographics and American higher education. *New Direct High Educ.* (2003) 121:3–12. doi: 10.1002/he.97
37. Payne EM, Hodges R, Hernandez EP. Changing Demographics and Needs Assessment for Learning Centers in the 21st Century. *Learn Assist Rev.* (2017) 22:21–36.
38. Guth S, Helm F. Suny coil Stevens initiative assessment final report. (2017). doi: 10.13140/RG.2.2.35940.27529
39. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res.* (2005) 15:1277–88. doi: 10.1177/1049732305276687
40. Assarroudi A, Heshmati Nabavi F, Armat MR, Ebadi A, Vaismoradi M. Directed qualitative content analysis: the description and elaboration of its underpinning methods and data analysis process. *J. Res Nurs.* (2018) 23:42–55. doi: 10.1177/1744987117741667
41. Elo S, Kyngäs H. The qualitative content analysis process. *J Adv Nurs.* (2008) 62:107–15. doi: 10.1111/j.1365-2648.2007.04569.x
42. Mezirow J. Understanding transformation theory. *Adult Educ Quart.* (1994) 44:222–32. doi: 10.1177/074171369404400403
43. Loes CN, Culver KC, Trolian TL. How collaborative learning enhances students' openness to diversity. *J Higher Educ.* (2018) 89:935–60. doi: 10.1080/00221546.2018.1442638
44. Lehtomäki E, Moate J, Posti-Ahokas H. Global connectedness in higher education: student voices on the value of cross-cultural learning dialogue. *Stud High Educ.* (2016) 41:2011–27. doi: 10.1080/03075079.2015.1007943
45. Kagitcibasi C. Autonomy and relatedness in cultural context: Implications for self and family. *J Cross Cult Psychol.* (2005) 36:403–22. doi: 10.1177/0022022105275959
46. Staszak JF. Other/otherness. (2009) 43–7. doi: 10.1016/B978-008044910-4.00980-9
47. Smith RA, Khawaja NG, A. review of the acculturation experiences of international students. *Int J Interc Relat.* (2011) 35:699–713. doi: 10.1016/j.ijintrel.2011.08.004
48. Bichrest MM, A. formal literature review of veteran acculturation in higher education. *InSight: Rivier Acad J.* (2013) 9:1–2.
49. Nekby L, Rödin M, Özcan G. Acculturation identity and higher education: Is there a trade-off between ethnic identity and education? *Int Migrat Rev.* (2009 D) 43:938–73. doi: 10.1111/j.1747-7379.2009.00790.x
50. Ward C. The A, B, Cs of acculturation. In: Matsumoto D, editor. *The handbook of culture and psychology*. Oxford University Press (2001), 411–45.
51. Marcillo-Gómez M, Desilus B. Collaborative online international learning experience in practice opportunities and challenges. *J Technol Manage Innov.* (2016) 11:30–5. doi: 10.4067/S0718-27242016000100005
52. Kayumova AR, Sadykova GV. Online collaborative cross-cultural learning: students' perspectives. *J Organiz Cult Commun Conflict.* (2016) 20:248.
53. Villar-Onrubia D, Rajpal B. Online international learning: Internationalising the curriculum through virtual mobility at Coventry University. *Perspect Policy Pract Higher Educ.* (2016) 20:75–82. doi: 10.1080/13603108.2015.1067652
54. Naicker A, Singh E, van Genugten T. Collaborative Online International Learning (COIL): Preparedness and experiences of South African students. *Innov Educ Teach Int.* (2021) 1–2. doi: 10.1080/14703297.2021.1895867
55. Chiu TK, Lin TJ, Lonka K. Motivating online learning: the challenges of COVID-19 and beyond. *Asia-Pacific Educ Res.* (2021) 30:187–90. doi: 10.1007/s40299-021-00566-w

56. Hartling X. Collaborative online international learning in a business course during the COVID-19 pandemic. *ASBBS Proc.* (2021) 28:93–8.

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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frontiers | Frontiers in Public Health

TYPE Curriculum, Instruction, and Pedagogy
PUBLISHED 20 September 2022
DOI 10.3389/fpubh.2022.966872

OPEN ACCESS

EDITED BY
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SPECIALTY SECTION
This article was submitted to Public Health Education and Promotion, a section of the journal Frontiers in Public Health

RECEIVED 11 June 2022
ACCEPTED 26 August 2022
PUBLISHED 20 September 2022

CITATION
Gautam D, Sandhu S, Kutzer K, Blanchard L, Xu J, Sotelo Munoz V, Dennis E, Drake C, Crowder C, Eisenson H and Prvu Bettger J (2022) Training student volunteers as community resource navigators to address patients' social needs: A curriculum toolkit.
Front. Public Health 10:966872.
doi: 10.3389/fpubh.2022.966872

Training student volunteers as community resource navigators to address patients' social needs: A curriculum toolkit

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Introduction: Few resources are available to train students to provide patients assistance for obtaining needed community-based services. This toolkit outlines a curriculum to train student volunteers to become "community resource navigators" to serve patients *via* telephone at partner health sites.

Methods: University students co-designed the Help Desk navigator program and training for volunteer navigators as part of an academic-community partnership with a local Federally Qualified Health Center (FQHC). The multi-modal curricula consisted of five components: didactic instruction on social determinants of health and program logistics, mock patient calls and documentation, observation of experienced navigator interaction with patients, supervised calls with real patients, and homework assignments. In 2020, training materials were adapted for virtual delivery due to the COVID-19 pandemic. Trainees completed a survey after completion to provide qualitative feedback on the training and preparedness.

Results: The training was offered for the first cohort of 11 student volunteer navigators in 2019, revised and then offered for 13 undergraduate and nursing students over 6 weeks in 2020. In the training evaluation, trainees described the new knowledge and skills gained from the training, the long-term benefits toward their educational and professional career goals, and helpful interactive delivery of the training. Trainees also highlighted areas for improvement, including more time learning about community resources and practicing challenging patient conversations.

Conclusions: Our peer-to-peer, multi-modal training prepares student volunteers to become community resource navigators. Student, eager for meaningful clinical experiences, are an untapped resource that can help patients with their social needs.

KEYWORDS

social determinants of health (MeSH), social needs, primary care (MeSH), academic-community partnership, curriculum-undergraduate and postgraduate

Introduction

According to the World Health Organization, the social determinants of health (SDOH) are "the conditions in which people are born, grow, work, live and age, and the wider set of forces and systems shaping the conditions of daily life" (1). The United States Healthy People 2030 initiative has prioritized improving SDOH in their overarching objectives to improve health and wellbeing nationwide. Specifically, they organize SDOH into five broad categories: economic stability, education, social and community context, health and health care, and neighborhood and built environment (2). Downstream consequences of SDOH include patient-level social needs, such as food insecurity, transportation barriers, social isolation, and housing instability (3). These social needs are major drivers of health and health disparities (4). In response, multiple professional organizations across medical specialties, government agencies, and the National Academy of Medicine have recommended healthcare providers identify and address patients' social needs (5–8). Unfortunately, community-based healthcare organizations may lack the capacity to fully address these needs. Through academic-community partnerships, the health sector can leverage student volunteers as an untapped resource to improve integrated health and social care. In return, students build valuable inter- and intraprofessional competencies in a meaningful experiential learning opportunity with exposure to the relationship between SDOH and health outcomes.

Despite growing evidence on the feasibility and effectiveness of volunteer models that engage students to address social needs in the clinical setting (9–12), most studies do not provide full details of the content and delivery of the training program needed for replication (13). The purpose of this paper is to disseminate a structured curriculum for an expert-informed, peer-to- peer training model that can be adopted and adapted by other programs to train undergraduate and pre-licensure health professions students to become volunteer "community resource navigators." Our multimodal structured trainings, originally developed through an academic-community partnership, can be used to equip student volunteers with the knowledge and skills necessary to help patients in accessing resources to meet their unmet social needs.

Methods and pedagogical framework

Program background

In 2018, four university students and a professor partnered with the chief medical officer and director of behavioral health at a Federally Qualified Health Center (FQHC) in Durham, North Carolina to co-develop and implement a "Help Desk" volunteer program. In this model, case managers on the FQHC's behavioral health team screen clinic patients for social needs using the Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences (PRAPARE) screening tool and refer them to resources internal to the FQHC or to community-based resources that address unmet social needs such as food, transportation, and housing (14). Student volunteer "community resource navigators" follow-up with patients telephonically in English or Spanish, both 2 weeks and 4 weeks after their initial visit. Their goal is to help patients overcome potential barriers and encourage the initiation of services or uptake of community resources.

This ongoing academic-community partnership, now in its fourth year, was originally supported through a university-wide initiative to support interdisciplinary research teams of students, faculty, and community partners tackling complex societal challenges. Between spring 2018 to present (fall 2021), key phases of the partnership included (i) a 3-month engagement period among partners to discuss the target patient population and opportunities for students to complement existing social care efforts, (ii) a six-month planning period to develop navigator workflows, trainings, resource directory, and data infrastructure, (iii) a two-month pilot, and (iv) over 2 years of program implementation, maintenance, and scale-up as part of routine clinical care. Full program details are described elsewhere (14–17). The program continues with annual appointments of new student leadership who recruit, train, and manage a cohort of peers who volunteer as navigators for healthcare partners as part of a university student organization.

Curriculum development, learning objectives, and learning areas

Our curriculum aims to equip volunteers with the knowledge and skills needed to telephonically motivate patients to connect to community resources, as recommended by their case manager, and if necessary, to work with patients to identify alternative resources. Helping patients manage their social needs requires students to understand community resources, communicate effectively and compassionately, and tailor support to respond to individual circumstances.

Curriculum development was guided by the literature (18–20) and by partners and advisors with expertise in community-based health care delivery, general and pediatric medicine, behavioral health, health services and implementation research, academic curriculum development, and clinician education. Our student team actively engaged FQHC leadership and case managers to identify the essential knowledge and skills to support their patients as navigators.

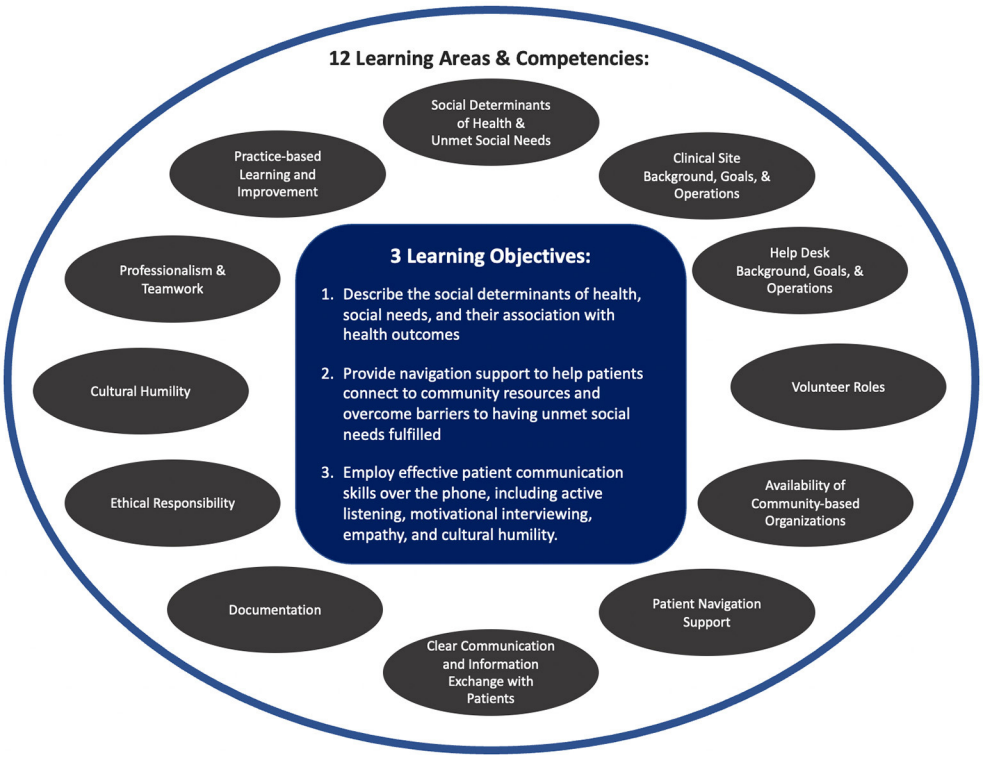

FIGURE 1
Help desk learning objectives and learning areas.

Additionally, we consulted similar social needs volunteer programs to learn about their process for experiential training components (10, 21).

The student leadership team created a set of three overarching learning objectives, 12 learning areas (Figure 1), and 54 specific learning outcomes (Appendix 1). Since targeted trainees included pre-medical students, we also aligned our training's areas and specific materials with the core pre-professional competencies outlined by Association of American Medical Colleges (AAMC) (22). Our curriculum and program develops 12 of the 15 AAMC competencies, including service orientation, social skills, cultural competence, teamwork, oral communication, ethical responsibility to self and others, reliability and dependability, resilience and adaptability, capacity for improvement, critical thinking, written communication, and human behavior. Our curriculum also aligns more broadly with essential learning objectives for liberal arts education defined by American Association of Colleges and Universities (e.g., personal and social responsibility, integrative and applied learning) and leverages multiple evidence-based, high-impact practices shown to be associated with higher levels of learning success (e.g., service-learning, community-based learning) (23, 24).

Learning environment and pedagogical format

Volunteer recruitment

Target learners include medical, nursing, undergraduate and graduate students in any area of study. To advertise the training program and opportunity, we reached out to pre-health and health professions student organizations, cultural student groups, and academic programs. We assessed applicants' demonstrated interest in SDOH, previous clinical and volunteer experiences, and ability to relate to the diverse patient population served by our health care partner. We also conducted interviews and mock patient calls to assess applicants' oral communication skills and ability to demonstrate empathy over the phone. Those interested in serving Spanish-speaking patients were cleared for Spanish language fluency by a native Spanish speaker on the student leadership team. A sample of our recruitment materials is available in Appendix 2.

TABLE 1 Student volunteer characteristics.

Characteristics	Number of volunteers ($N = 24$)
Race/ethnicity	
Asian	8
Hispanic	8
White	7
Black	1
Gender	
Female	18
Male	6
Student level	
Undergraduate	17
2nd year undergraduate	*(4)*
3rd year undergraduate	*(8)*
4th year undergraduate	*(5)*
Graduate or professional	7
Degrees/programs	
Natural sciences (e.g., Biology, Neuroscience)	9
Social sciences (e.g., Public Policy, Psychology)	8
Health professions (Medicine, Nursing)	5
Mathematics or computer science	2
Career trajectories of graduated students	
Health professions students (e.g., medicine, dentistry, clinical psychology)	15
Resident physician	1
Licensed nurse	3
Health policy research	1
Other	1
Average semesters volunteered	2.5

Training implementation

The training was first delivered in 2019 by the four program's developers and experienced student navigators (SS, LB, JX, VSM) for a cohort of 11 student volunteers. Over the 2019–2020 implementation year, the curriculum was refined and then delivered by three Help Desk program leads and experienced student navigators (DG, KK, SS) for our second cohort of thirteen students to volunteer in 2020–2021. Demographic characteristics of our trainees are presented in Table 1.

Volunteer recruitment, selection, onboarding, and training took 12 weeks. The training program consisted of five components: didactic instruction on SDOH and program logistics, homework assignments, mock patient calls and documentation, observation of experienced navigators with patients, and supervised calls with actual patients. Appendix 3 outlines the full training overview and detailed timeline. The didactic component consisted of three facilitated, 2–3 h- long modules conducted over three different sessions (Figure 2). Help Desk student leads facilitated all three didactic sessions. The facilitator's guide is in Appendix 4.

Module 1 aims to address the first learning objective: *describe the social determinants of health and how they affect health outcomes.* The module included PowerPoint presentations (Appendix 5) on SDOH, an overview of interventions to address social needs in clinic settings and the history and goals of our local Help Desk program. Learners also participated in an interactive activity to explore data on disparities in health and social needs in the local community (activity handout in Appendix 6).

Module 2 aims to address the learning objective: *provide navigation support to help patients connect to community resources and overcome barriers.* The module included a PowerPoint presentation (Appendix 7) on the Help Desk program workflow, a pre-recorded video demonstrating documentation of patient data into our electronic REDCap database, and an interactive activity to learn about community-based organizations using our program's community resource directory (activity handout in Appendix 8). Using the twenty-four most common resource referrals from our data (18), learners worked in assigned groups to explore a resource (e.g., local food pantry) and present to the whole cohort on: (i) how each resource specifically addresses a patient's need (ii) the target population, and (iii) the best way to access each resource.

Module 3 aims to address the learning objective: *demonstrate effective patient communication skills over the phone, including active listening, motivational interviewing, empathy, and cultural humility.* This module included a PowerPoint presentation (Appendix 9) that addressed the goals of follow-up calls, and further discussed motivational interviewing strategies, the call script, call logistics, and data entry. The session concluded with a peer-to-peer mock call activity (activity handout in Appendix 10). Between modules 2 and 3, learners completed homework activities that aligned with both module's learning objectives. Activities included reviewing the volunteer handbook and script, watching a video demonstration of a typical Help Desk call and a YouTube video about motivational interviewing (25), and completing a reflection exercise with questions aimed to improve retention and understanding.

All three didactic modules were conducted over 1 week in three separate sessions. Session one and two lasted 2 h each, and session three lasted 3 h. For the first cohort in 2019, didactic training components were conducted in-person in a conference room at the university using handouts and slideshow presentations were displayed with projectors. For our second cohort of students in 2020, all didactic components of the training were conducted virtually *via* Zoom due to the COVID-19 pandemic. Handouts could be viewed on the volunteers' personal computers and the student leadership team used the share screen function in Zoom to deliver didactic

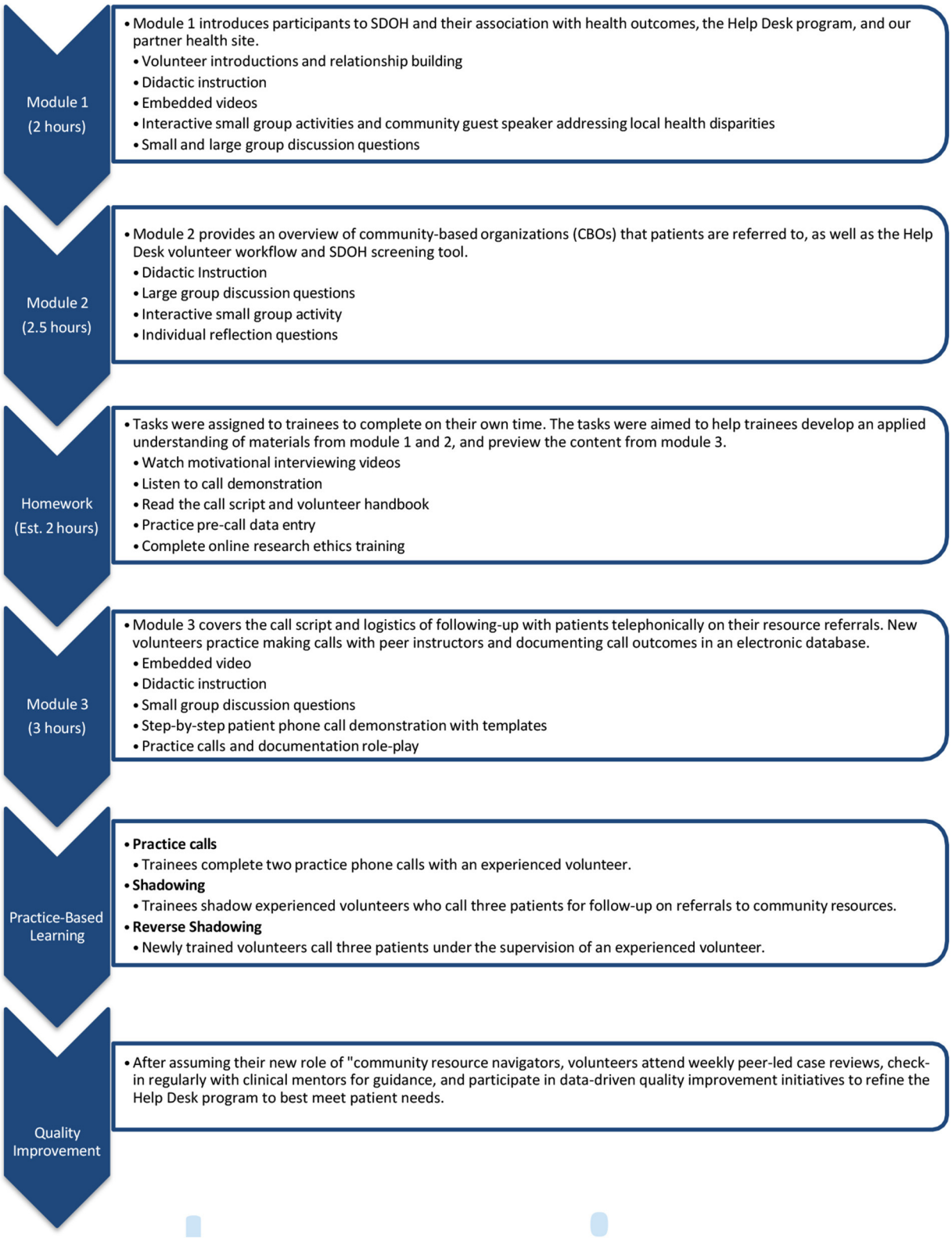

FIGURE 2
Help desk training overview.

instruction. Group interactive activities were facilitated using Zoom breakout rooms. There were no prerequisites for the didactic modules.

Following all three sessions, learners completed two practice calls with a student facilitator who offered feedback on community resource fit, motivational interviewing technique, and conversational flow. Similarly to didactic training, these practice sessions were conducted in a conference room for the first cohort and *via* Zoom in breakout rooms for the second cohort. Appendix 11 includes materials for the practice call, such as patient scenarios, fake completed social needs screening assessments, and telephone scripts. Learners then completed on-boarding requirements for our partner health site (e.g., background check, reviewing HIPAA and protected health information fact sheets). The first cohort completed the health site specific onboarding in-person at the FQHC in a single day. However, the second cohort completed this onboarding remotely by reviewing these materials due to the pandemic. Subsequent cohorts have returned to completing the partner health site specific orientations in person, however; all other parts of training have remained virtual for convenience and costs.

Once approved, learners shadowed current resource navigators in completing three patient calls before calling three patients under the supervision of an experienced volunteer. The first cohort completed shadowing and reverse shadowing calls on the university campus in the designated Help Desk call room. Having students call patients from a secure office on the main university campus rather than traveling to the FQHC prevented transportation challenges for students and enabled our team to overcome the lack of physical space at the FQHC to accommodate a student office on-site. The second cohort completed patient calls *via* Zoom with the calls on speaker phone so both the volunteer in training and the student facilitator could hear the call. Facilitator guides were created for the practice calls (Appendix 12), shadowing (Appendix 13), and reverse shadowing (Appendix 14). During practice calls and reverse shadowing experiences, experienced navigators completed a fidelity checklist to track progress (Appendix 15). Once learners completed the full training and became real-world "Help Desk" volunteers, they further refined their skills through continuing education activities, including weekly peer-led case reviews, and tested revisions to their workflows and role as part of continuous quality improvement processes.

Program and curriculum evaluation

We evaluated our curriculum and program across five domains, and these are reflected in our program's logic model (15). In brief, these include student experience of the training program, student knowledge and skills gained from the training, student growth from participating in the program, student-led dissemination efforts, and student volunteer effectiveness for patient reach and service connection.

Student experience with the training program

We conducted a qualitative evaluation of our curriculum for its second implementation with the 2020–2021 cohort. We asked learners to complete a survey with five open-ended reflection questions (Appendix 16). The evaluation methodology and structure were adapted from an interprofessional training program for medical students to address health disparities (26). The survey allowed the students to reflect on the strengths and weaknesses of the training and what they learned from it. We administered the survey 3 weeks after the conclusion of training when learners have had experience making several calls on their own.

Three team members (DG, KK, and SS) reviewed survey responses and conducted a thematic content analysis (27). First, we created preliminary codes *via* an inductive approach. Second, we grouped our preliminary codes into broader themes and subthemes, with representative quotations. Given our training targeted a small group of learners in the first two first years, our qualitative methodology enabled us to gather more robust and concrete feedback to drive improvement efforts for future years (28). We received open-ended evaluation survey responses from 10 of the 2020–2021 learners (nine undergraduates and one nursing student).

Student knowledge and skills gained from the training

The same qualitative survey and thematic content analysis described above was also used to assess student acceptability of the training program.

Student growth from program participation

Given the long-term student outcome for our program was to prepare students as contributing members of the public health system, we measured the number of students who pursued healthcare and health-related professions after graduating.

Student-led dissemination efforts

Help Desk volunteers collected patient-reported outcomes and experience data through follow-up calls in an effort to improve patient experience with primary care at the partner FQHC and to contribute to the evidence base for social interventions. Measures for dissemination of our program include the number of student-led peer-reviewed publications and posters/presentations at state, national, and international conferences.

Student volunteer effectiveness for patient reach and service connection

Measures for volunteer effectiveness include (1) number of patients referred to follow-up who were successfully reached *via* phone by student volunteers; (2) number of patients who attempted to contact a referred resource; and (3) number of patients who successfully connected with a referred resource.

Results

Student experience with the training program

Learners described the strengths and weaknesses of how the training components were delivered. They highlighted what was helpful, what could be improve upon, and gave helpful insights about the virtual nature of the training program. Representative quotes are presented in Table 3.

Utility of interactive and practice-based modules

Learners enjoyed the team-based, active learning components of the training. Activities such as researching local resources and practice calls with experienced volunteers helped to increase volunteer comfort working with patients and replicate real life conditions. Learners also shared the benefits of learning from previous Help Desk student volunteers.

Opportunities for improvement

Learners consistently described two areas for improvement: more time learning about community resources and practicing challenging patient conversations. Learners felt that our module on community resources felt rushed and hoped to learn more about specific eligibility requirements of resources and services for specific populations (e.g., Spanish-speaking patients). Learners also desired more "off-the-script" practice calls that had more curve balls, and specific training on strategies to handle difficult situations.

Virtual training

Learners felt that the virtual delivery of the training was smooth and did not negatively affect their ability to develop necessary skills and knowledge. Learners shared that utilizing breakout rooms in Zoom facilitated engagement among peers. Additionally, learners found recordings and availability of asynchronous materials useful in their learning.

TABLE 2 Representative quotes of learner feedback on student experience and delivery of training components.

Subtheme	Quote
Utility of interactive and practice-based modules	• "The fact that we researched most of the resources individually during training was also very helpful." • "Practice calls, shadowing, and reverse shadowing allowed me to feel comfortable when I made calls on my own as I felt like I had already interacted with patients before in a controlled environment when it was better to make mistakes." • "Each time I completed a practice call I felt considerably more confident and comfortable both with the script and with my ability to communicate with patients."
Opportunities for improvement	• "I wish we had spent a bit more time on learning the exact parameters of the most common referrals. By that I mean how reachable those referrals are, which ones can be relied upon, and which ones have a tendency to be less helpful." • "The only topic I wished we covered more is practicing scenarios with our peers when there was an abnormal situation such as the patient picking up the call in the hospital." • "Having more practice with strictly motivational interviewing situations and having direct feedback would be very helpful...I feel like it's such a valuable tool, but it's a skill, and skills take time to develop."
Virtual training	• "I don't think that the virtual training negatively impacted my experience primarily because since this volunteering is remote all of the practice was also remote meaning that it was very similar to what I am doing with directly volunteering. While direct interaction with people is always better than zoom I believe that the training could still be conducted over zoom in the future after COVID and the effectiveness will still be the same." • "Being virtual was pretty good for the setup we had. It made it really easy to share the screen and see what was going on. The breakout rooms were good because they let us practice looking things up in smaller groups and helped us stay engaged." • "I also benefited greatly from watching demonstrations of how to use certain resources, such as the End Hunger Durham food resource map. I felt that one place for improvement is that the specific discussion questions asked could have been a bit more tailored to align with the most common questions patients ask about these resources."

10.3389/fpubh.2022.966872

Student knowledge and skills gained from the training program

Learners described the knowledge and skills they gained to prepare them to become community resource navigators. They also identified how they could translate what they learned to their future educational and professional careers. Representative quotes are presented in Table 2.

New knowledge about social determinants of health and the local community

Learners were motivated by their improved knowledge of social determinants of health, the distribution of social risk factors in the local community, and resources available to support patients' social needs.

Improved interpersonal and communication skills

Learners valued their training in patient- provider communication, active listening, and empathy. In particular, they appreciated learning about motivational interviewing. Given some learners had little prior experience working directly with patients, they described the importance of practicing how to multitask during a patient call (e.g., listening to patients, navigating the script and resource information, and documenting the call), adapting the script when needed, and managing difficult conversations.

Applying knowledge and skills to future educational and professional career

Learners described how the training prepared them not just as community resource navigators, but as future physicians, nurses, and other health professionals.

Student growth from program participation

The Help Desk program has supported students in pursuing healthcare and health-related professions (19 of 20 volunteers who have already graduated from Duke University). Fifteen pre-health students of the Help Desk program have successfully matriculated into a health professions graduate program (e.g., medical, dental, clinical psychology), four graduate students who were already in health professions schools have successfully become registered nurses or resident physicians, and one student has successfully pursued a career in health policy research (Table 1).

TABLE 3 Representative quotes on knowledge gained and skills developed by learners.

Subtheme	Quote
New knowledge about social determinants of health and the local community	• "I learned a lot about the Durham community… my biggest takeaway is my new knowledge of the community organizations (especially food pantries) that are available to Durham residents." • "The training program did a great job of emphasizing and educating volunteers about which social determinants of health the Durham community faces."
Improved interpersonal and communication skills	• "I will definitely use the phone skills and motivational interviewing techniques to help patients discover their own reasons for making healthy changes...As a nurse, it is important to make sure my patients will be able to follow through with their wellness goals and treatment, so this has been eye opening to different barriers to care that I did not previously consider." • "I think one of the biggest takeaways was improving my ability to adapt a set script to a patient's individual needs so that their experience is more personalized and they feel heard… [another] takeaway was practicing empathy without letting my feelings overwhelm me." • "It's very frustrating not being able to help people experiencing exceedingly stressful circumstances. However, for that reason, I have found it very valuable to put into practice the emotional support skills we learned."
Applying knowledge and skills to future educational and professional career	• "I enjoyed case review because it adds a team aspect to the program. I love how we can discuss the patients, and potential resource referrals to help our patients. This is an aspect that I think connects to working with a team of medical professionals in the future." • "I hope to become a physician in the future and communication with patients while empathizing and informing them about tough subjects is a crucial part of the job. Thus, the skills garnered about having tough conversations as well as the tough conversations I have had with patients have allowed me to be better prepared in that regard for my future career."

Student-led dissemination efforts

Our work has resulted in four student-led, peer-reviewed publications and eight presentations at state, national, international conferences focused on the development and implementation of the Help Desk model, adaptations of the program during the pandemic, evaluating factors associated with a successful patient referral, and patient-reported barriers to accessing referred resources (15–17, 29).

Student volunteer effectiveness for patient reach and service connection

Between March 2019 and December 2020, student volunteers called 791 patients and successfully reached 501 (78%) of patients referred to follow-up by their case manager (17). Within 4 weeks of the initial referral, 63.3% of patients had at attempted to contact at least referred resource and 32.7% had started services with 1 or more of their referred resources (17).

Discussion

Our curriculum trains student volunteers to become "community resource navigators" to serve patients with health-related social needs, such as food insecurity and housing instability, at partner health care sites *via* telephone. The curriculum uses a peer-to peer model and multimodal approach that includes didactic instruction, interactive activities, homework activities, peer shadowing, and supervised phone calls with clinic patients. Trainees reported gaining the specific knowledge and skills needed to help patients connect to community resources. Our curriculum's hands-on approach which provided trainees repeated opportunities to practice their role was crucial for students to develop the necessary confidence and competence.

Our curriculum is unique in the scope and types of learners targeted. While other published SDOH education materials have focused on medical students or residents (25–30), our curriculum focused on training an interprofessional group of students, that included undergraduate and graduate students. To our knowledge, we are the first group to develop a service-learning program aimed to assist patients with social needs, expand capacity of health services, and include learning outcomes intentionally designed to align with the AAMC's "Core Competencies for Incoming Medical Students." Our curriculum emphasized fundamental patient-provider communication skills, such as motivational interviewing and active listening, in addition to SDOH content and service orientation. We encourage the medical education community to consider how they can extend their research and education initiatives to engage the pipeline of college students interested in the health professions.

The strengths of our program include its multi-modal, virtual delivery that allowed for both synchronous and asynchronous learning. Previous curricula have focused on educating students broadly on SDOH and their impacts on health, screening for social needs, and physician advocacy (26, 27). In contrast, our curriculum specifically trains students to help patients navigate community resources to address social needs. Students shadowed and practiced patient phone calls with experienced student navigators, and conducted supervised calls with clinic patients.

Centered on an engagement opportunity outside of the classroom and traditional academic curricula, our program focuses on preparing students to immediately work with patients in a volunteer capacity through a service-learning program developed through an academic- community partnership.

Our qualitative analysis of post-training survey revealed positive feedback from students and will inform future curricular design. Consistent with findings from evaluations of other SDOH curriculum, students described they gained knowledge of social determinants of health and health disparities of the local community, and skills to address social needs (30, 31). Unique to our study, likely due to our focus on preprofessional learners, students reported their development of broader interpersonal and communication skills needed to become future physicians and health professionals. Survey data also highlighted opportunities for curricular improvements: in future iterations, we will spend more time discussing local community resources and will develop more difficult patient scenarios for practice calls.

Supporting successful sustainability and scalability

Since the original two cohorts, we have trained an additional 64 students to become Help Desk navigators and currently have 43 active volunteers as of Summer 2022. In addition to continue to support our original FQHC partner, we have adapted our training materials and workflows to serve other clinical sites in Durham, North Carolina including our own institution's Emergency Department and pediatrics clinic. In fall 2022, we are also planning to expand our program to serve additional service lines in our institution's health system in partnership with our health system's population health management office. Recent adaptations to our training and service model include deploying students to move beyond follow-up calls to also screen patients for social needs and to make resource referrals using a new, state-wide electronic referral platform for health and social services.

While this paper focuses of disseminating curricular components our structured training program, there are remaining research opportunities to evaluate the implementation and effectiveness of our training approach. First, administering pre-post surveys to students, with survey items mapped to our curricular learning objectives and learning areas, can provide quantitative evidence of training effectiveness and better identify curricular gaps. Second, we can assess the volunteer characteristics associated with better patient outcomes and satisfaction (e.g., undergraduate vs. health professions graduate students; year in school; degree program; previous volunteer experience; length of engagement; racial, ethnic, and language concordance between navigator and patient). Third, we can compare the effectiveness of a trained student workforce in supporting patients' social needs to other healthcare staff. For example, we are currently conducting a study using a factorial design to evaluate the effectiveness of providing social care in primary care across social workers, community health workers, and student volunteer navigators.

As other institutions consider replicating or adapting our curriculum and broader program components, there are a variety of lessons learned that may be helpful to consider. First, implementation requires an existing infrastructure for students to volunteer with a partner healthcare organization to provide direct service to patients. Approaches may include academic-community research projects, service-learning models integrated into undergraduate coursework, expansion of applied interprofessional education programs to include undergraduate students, or student-led service organizations funded by the university. Across models, strong student leadership and faculty oversight are important to create and support the student workforce. For example, more recently our program has transitioned into an official student organization with a robust organizational structure. Leadership roles include program coordinators, specific site coordinators, recruitment and training leads, communication officer, treasurer, liaisons with community-based organizations, director of programming for continuing education, and a secretary.

While our peer-to-peer training model relies on current navigators to recruit and train the next volunteer cohort, others institutions launching their own program should consider having academic or clinical partners leading the trainings until a student-led program is fully in operation. In particular, having sufficient trainers to supervise the applied, experiential components of the training (e.g., practice calls with other students using a fidelity checklist) is crucial. For successful implementation beyond the initial training, we recommend that navigators be continuously trained on communication and community resources throughout their tenure. Local services and eligibility change, and these nuances can dramatically affect patient access and the ability to have needs met.

This toolkit provides educators, community partners, and clinical leadership the resources to train students to function as volunteers in program to address social needs. Our curriculum demonstrates the feasibility and opportunity to include university students interested in health professions in interprofessional education activities, while increasing clinic capacity to support patients' unmet social needs through a trained volunteer workforce.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author/s.

Author contributions

DG, SS, and KK drafted the manuscript. All authors revised the manuscript critically for important intellectual content, approved of the version of the manuscript to be published, and were involved in the conception and implementation of the project.

Funding

Funding was provided by the Duke University Bass Connections Program (Durham, NC, USA).

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2022.966872/full#supplementary-material

References

1. Social Determinants of Health. Available online at: https://www.who.int/health-topics/social-determinants-of-health (accessed August 22, 2022).

2. Healthy People 2030. *Office of Disease Prevention and Health Promotion, Department of Health and Human Services.* (2021). Available online at: https://health.gov/healthypeople (accessed August 22, 2022).

3. Alderwick H, Gottlieb LM. Meanings and misunderstandings: a social determinants of health lexicon for health care systems. *Milbank Q.* (2019) 97:407–19. doi: 10.1111/1468-0009.12390

4. Kreuter MW, Thompson T, McQueen A, Garg R. Addressing social needs in health care settings: evidence, challenges, and opportunities for public health. *Annu Rev Public Health.* (2021) 42:329–44. doi: 10.1146/annurev-publhealth-090419-102204

5. COUNCIL ON COMMUNITY PEDIATRICS, Gitterman BA, Flanagan PJ, Cotton WH, Dilley KJ, Duffee JH, et al. Poverty and child health in the United States. *Pediatrics.* (2016) 137:e20160339. doi: 10.1542/peds.2016-0339

6. Sandhu S, Sharma A, Cholera R, Bettger JP. Integrated health and social care in the United States: a decade of policy progress. *Int J Integr Care.* (2021) 21:9. doi: 10.5334/ijic.5687

7. Daniel H, Bornstein SS, Kane GC. For the health and public policy committee of the American college of physicians. Addressing social determinants to improve patient care and promote health equity: an american college of physicians position paper. *Ann Intern Med.* (2018) 168:577. doi: 10.7326/M17-2441

8. National Academies of Sciences E. *Integrating Social Care into the Delivery of Health Care: Moving Upstream to Improve the Nation's Health.* (2019). Available online at: https://nap.nationalacademies.org/catalog/25467/integrating-social-care-into-the-delivery-of-health-care-moving (accessed August 22, 2022).

9. Gottlieb LM, Hessler D, Long D, Laves E, Burns AR, Amaya A, et al. Effects of Social Needs Screening and In-Person Service Navigation on Child Health: A Randomized Clinical Trial. *JAMA Pediatr.* (2016) 170:e162521. doi: 10.1001/jamapediatrics.2016.2521

10. Garg A, Marino M, Vikani AR, Solomon BS. Addressing Families' Unmet Social Needs Within Pediatric Primary Care: The Health Leads Model. *Clin Pediatr (Phila).* (2012) 51:1191–3. doi: 10.1177/0009922812437930

11. Berkowitz SA, Hulberg AC, Standish S, Reznor G, Atlas SJ. Addressing Unmet Basic Resource Needs as Part of Chronic Cardiometabolic Disease Management. *JAMA Intern Med.* (2017) 177:244. doi: 10.1001/jamainternmed.2016.7691

12. Nguyen AL, Mosqueda LA, Angulo M, Haghi LL, Cruz M, Nikroo N, et al. *A Clinic-Based Pilot Intervention to Enhance Diabetes Management for Elderly Hispanic Patients.* (2016). Available online at: http://hee-journal.uni-koeln.de/20550.html (accessed August 22, 2022).

13. Sandhu S, Xu J, Eisenson H, Prvu Bettger J. Workforce models to screen for and address patients' unmet social needs in the clinic setting: a scoping review. *J Prim Care Community Health.* (2021) 12:215013272110210. doi: 10.1177/21501327211021021

14. Drake C, Eisenson H. Assessing and addressing social needs in primary care. *NEJM Catal.* (2019) 5:1–12. doi: 10.1056/CAT.19.0693

15. Sandhu S, Xu J, Blanchard L, Eisenson H, Crowder C, Munoz VS, et al. A community resource navigator model: utilizing student volunteers to integrate health and social care in a community health center setting. *Int J Integr Care.* 21:2. doi: 10.5334/ijic.5501

16. Sandhu S, Lemmon ME, Eisenson H, Crowder C, Bettger JP. Addressing the social determinants of health during the COVID-19 pandemic: ensuring equity, quality, and sustainability. *Fam Community Health.* (2021) 44:78–80. doi: 10.1097/FCH.0000000000000290

17. Lian T, Kutzer K, Gautam D, Eisenson H, Crowder JC, Esmaili E, et al. Factors associated with patients' connection to referred social needs resources at a federally qualified health center. *J Prim Care Community Health.* (2021) 12:215013272110243. doi: 10.1177/21501327211024390

18. Ustjanauskas AE, Bredice M, Nuhaily S, Kath L, Wells KJ. Training in patient navigation: a review of the research literature. *Health Promot Pract.* (2016) 17:373–81. doi: 10.1177/1524839915616362

19. Duggleby W, Robinson CA, Kaasalainen S, Pesut B, Nekolaichuk C, MacLeod R, et al. Developing navigation competencies to care for older rural adults with advanced illness. *Can J Aging Rev Can Vieil.* (2016) 35:206–14. doi: 10.1017/S0714980816000131

20. Quinn MT, McNabb WL. Training lay health educators to conduct a church-based weight-loss program for African American women. *Diabetes Educ.* (2001) 27:231–8. doi: 10.1177/014572170102700209

21. Bay Area Regional Help Desk Consortium - Overview, News & Competitors. *ZoomInfo.com. ZoomInfo.* Available online at: https://www.zoominfo.com/c/bay-area-regional-help-desk-consortium/542290025 (accessed August 22, 2022).

22. Core Competencies for Entering Medical Students. *AAMC.* Available online at: https://www.aamc.org/services/admissions-lifecycle/competencies-entering-medical-students (accessed August 22, 2022).

23. Essential Learning Outcomes. AAC&U. Available online at: https://www.aacu.org/trending-topics/essential-learning-outcomes (accessed August 22, 2022).

24. High-Impact Practices. *AAC&U.* Available online at: https://www.aacu.org/trending-topics/high-impact

25. Bill Matulich. *Introduction to Motivational Interviewing.* (2013). Available online at: https://www.youtube.com/watch?v=s3MCJZ7OGRk (accessed August 22, 2022).

26. Neff J, Holmes SM, Knight KR, Strong S, Thompson-Lastad A, McGuinness C, et al. Structural competency: curriculum for medical students, residents, and interprofessional teams on the structural factors that produce health disparities. *MedEdPORTAL.* (2020) 10888. doi: 10.15766/mep_2374-8265.10888

27. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res.* (2005) 15:1277–88. doi: 10.1177/1049732305276687

28. Hanson JL, Balmer DF, Giardino AP. Qualitative research methods for medical educators. *Acad Pediatr.* (2011) 11:375–86. doi: 10.1016/j.acap.2011.05.001

29. Sandhu S, Lian T, Smeltz L, Drake C, Eisenson H, Bettger JP. Patient barriers to accessing referred resources for unmet social needs. *J Am Board Fam Med JABFM.* (2022) 35:793–802. doi: 10.3122/jabfm.2022.04.210462

30. Schmidt S, Higgins S, George M, Stone A, Bussey-Jones J, Dillard R. An experiential resident module for understanding social determinants of health at an academic safety-net hospital. *MedEdPORTAL.* (2017) 10647. doi: 10.15766/mep_2374-8265.10647

31. McDonald M, West J, Israel T. From identification to advocacy: a module for teaching social determinants of health. *MedEdPORTAL.* (2015) 10266. doi: 10.15766/mep_2374-8265.10266

frontiers | Frontiers in Public Health

TYPE Curriculum, Instruction, and Pedagogy
PUBLISHED 20 September 2022
DOI 10.3389/fpubh.2022.958184

OPEN ACCESS

EDITED BY
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SPECIALTY SECTION
This article was submitted to Public Health Education and Promotion, a section of the journal Frontiers in Public Health

RECEIVED 31 May 2022
ACCEPTED 25 August 2022
PUBLISHED 20 September 2022

CITATION
Przybyla SM, Cprek SE and Kiviniemi MT (2022) Infusing high-impact practices in undergraduate public health curricula: Models, lessons learned, and administrative considerations from two public universities. *Front. Public Health* 10:958184. doi: 10.3389/fpubh.2022.958184

Infusing high-impact practices in undergraduate public health curricula: Models, lessons learned, and administrative considerations from two public universities

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High-impact practices (HIPs) can improve the rigor, quality, and outcomes of undergraduate education. Several high-impact practices are explicitly woven into the overarching goals, learning objectives, and curricular competencies for undergraduate public health degree programs, while others are natural fits. However, capitalizing on the value of HIPs for public health undergraduates requires a conscious effort in the process of curriculum design, course delivery, and administration of these programs. In this paper, we discuss both conceptual approaches and practical steps involved in the integration of HIPs in curriculum design and implementation. We discuss two exemplars of undergraduate programs that incorporate high-impact practices, illustrating how the same practices can be developed and implemented in different but equally effective ways across programs. We close with practical suggestions for designing or refining an undergraduate program to maximize the inclusion and effectiveness of high-impact practices.

KEYWORDS

high impact practices (HIPs), undergraduate public health, curriculum design, learning outcomes, public health education

Introduction

An undergraduate education has moved from an elite opportunity to the standard for a majority of American young adults. In 2016, nearly 70% of high school graduates between the age 18–26 enrolled in college (1), whereas only about 5% of Americans earned a bachelor's degree in 1950 (2). Both the significant enrollment increase and the substantial shift in racial/ethnic and socioeconomic diversity of the undergraduate population has required higher education to critically assess both the goal and process of educating the majority of the country's high school graduates.

As a part of a broader initiative to provide essential student learning outcomes for higher education programs throughout the nation (3, 4), the American Association of Colleges and Universities led an initiative to identify effective teaching and learning strategies, referred to as High Impact Practices (HIPs), which support student learning and success (5). This initiative included an assessment of students who historically experience lower rates of success (e.g., retention, degree attainment) within the field of post-secondary education, specifically first-generation college students, racial/ethnic minority students, and students living in poverty (5, 6).

The HIPs commonly discussed in the literature include: common intellectual experiences; writing intensive courses; collaborative assignments and projects; undergraduate research; diversity and global learning; service and community-based learning; capstone courses and projects; first-year seminars and experiences; learning communities; ePortfolios; and internships (5–7). Use of these HIPs lead to improved student learning, increased retention, and improved engagement (6). Further, there is a significant dose-response relationship between the number of HIPs experienced by students and overall student success. Significantly, research has demonstrated that historically disadvantaged students show a greater positive academic impact from experiencing HIPs, resulting in a reduction in the achievement gap between these students and the traditionally advantaged undergraduate student population (6).

Goals of undergraduate education in public health, high-impact practices, and liberal education learning outcomes—Integrations and opportunities

A review of the common goals of undergraduate education in public health, as articulated in the scholarship of teaching and learning literature and codified in the Council on Education in Public Health (CEPH) accreditation criteria for undergraduate public health education finds many points of commonality with the defined set of HIPs. In addition, there are commonalities between the criteria, HIPs, and general articulations of the goals of general education/liberal education programs at universities, such as the widely-used LEAP (Liberal Education and America's Promise) learning outcomes developed by the American Association of Colleges and Universities (8).

In recent years, there have been several examinations of the goals specific to undergraduate public health education. Three broad goal categories have been suggested. First, undergraduate public health education has been situated within a liberal education framework, where the predominant goal is to give students the critical thinking skills, broad general education, and content area knowledge to be able to effectively problem solve, adapt into new roles, and apply public health thinking and practices to a variety of situations (9–11). A second framing centers undergraduate public health education in a professional education framework, with the primary goal being educating students to develop the skills needed to be successful in the public health workforce at the bachelor's level or to have the foundation of training to be successful in the workforce at higher levels with additional masters or doctoral- level training (12, 13). Finally, the third goal is that the bachelor's level training in public health is also preparation for a variety of both academic graduate and professional school career paths—including but not limited to graduate-level training in public health (e.g., MPH), doctoral degrees in public health research areas, and health professions training (e.g., medical school, dental school). This goal is common to both the liberal education and professional education framing of the degree.

Common to each of these goals is both content area knowledge and a strong set of intellectual and practical skills—critical thinking, problem solving, collaboration, communication, civic engagement, and project management, just to name a few (14, 15). The goal of HIPs are to provide robust preparation and therefore the best educational outcomes for students in these skillsets (5). Thus, incorporating HIPs into public health education is central to ensuring that our students leave their undergraduate training with the skills needed to be part of the public health workforce and the educated citizenry.

Because HIPs are implemented in and have their effects on learning through specific curricula (both in general education and within specific majors), effectively infusing HIPs into undergraduate public health programs should begin with consideration of the extent to which general education, undergraduate public health major curricula, and HIPs overlap and relate to one another. Identifying connections that can be used to infuse HIPs into the public health curriculum as well as general education offerings is a key step to effectively using HIPs in undergraduate education.

In Table 1, we present a "matching" of HIPs to CEPH's required elements of the undergraduate major in public health. In addition, because undergraduate majors are situated within a broader university curriculum that includes general education, we examine the relation of the CEPH learning outcomes and HIPs to the general education outcomes specified in the LEAP program (8).

There are three HIPs (common intellectual experience, diversity and global learning, and capstone experiences) that match closely to specific accreditation requirements and are therefore almost certainly part of any undergraduate public health curriculum. Given the core knowledge elements in the CEPH criteria as well as the interdisciplinary and generalist nature of public health practice, virtually all undergraduate public health curricula provide a common core. Given the emphasis on social determinants, health disparities, and cross-national health systems in the CEPH criteria, a focus on

TABLE 1 Mapping of high impact practices to CEPH accreditation requirements for undergraduate public health and AACU's LEAP essential learning outcomes.

HIPs	CEPH criteria (2016)	LEAP essential learning outcomes
HIPS core to UGPH curriculum and goals		
Common intellectual experiences	UGPH curricula – General education: D9 – overall curriculum introduces students to foundations of scientific knowledge, social/behavioral sciences, statistics, humanities/fine arts	Knowledge of human cultures and the physical and natural world
Diversity and global learning	D10: the socioeconomic, behavioral, biological, environmental and other factors that impact human health and contribute to health disparities the fundamental characteristics and organizational structures of the US health system as well as the differences between systems in other countries	Personal and social responsibility, including: Civic knowledge and engagement—local and global Intercultural knowledge and competence
Capstone courses and projects	D12: All students complete a cumulative, integrative and scholarly or applied experience or inquiry project that serves as a capstone to the education experience.	Integrative and applied learning, including: Synthesis and advanced accomplishment across general and specialized studies
HIPs naturally synergistic with UGPH		
Writing intensive courses	D10: basic concepts of public health-specific communication, including technical and professional writing and the use of mass media and electronic technology D11: basic concepts of public health-specific communication, including technical and professional writing and the use of mass media and electronic technology	Intellectual and practical skills, including: written and oral communication
Collaborative assignments and projects	D13: networking, organizational dynamics, teamwork and leadership	Intellectual and practical skills, including: Teamwork and problem solving
Undergraduate research	the basic concepts, methods and tools of public health data collection, use and analysis and why evidence-based approaches are an essential part of public health practice	Intellectual and practical skills, including: Inquiry and analysis Critical and creative thinking
Service learning, community-based learning		Personal and social responsibility, including Civic knowledge and engagement—local and global
Internships		Personal and social responsibility, including *Anchored* through active involvement with diverse communities and real-world challenges
HIPs with scope beyond a single academic program		
First-year seminars and experiences		
Learning communities		
ePortfolios		

diversity and global learning is also instinctively implied. Finally, a capstone experience is specifically required in the CEPH criteria.

Next, there are a group of HIPs that we would argue are natural fits with the undergraduate public health degree and can and should be integrated into curriculum design wherever possible. Writing-intensive courses are a high impact way to meet the CEPH criteria's focus on communication and writing skills. Collaborative course assignments provide students with training in the cross-cutting

competencies of networking, organizational dynamics, and teamwork/leadership. Undergraduate research experiences, in addition to preparing students for public health research careers and graduate education, address competencies in the methods and tools of public health data collection and analysis. Finally, both service-learning opportunities and internships provide ways to address learning goals for public health students.

The remaining HIPs, first-year seminars, learning communities, and ePortfolios are, by their nature more university-wide in terms of structure, oversight, and delivery. Although we would strongly encourage undergraduate public health programs to pursue involvement in these HIPs, they fall outside of the focus of this paper given that they go beyond the public health curriculum and program itself.

Learning environment

The following section will provide concrete examples of incorporating HIPs into undergraduate public health curricula. We will explore two undergraduate public health programs, the University at Buffalo's Bachelor of Science in Public Health and the University of Kentucky's Bachelor of Public Health. For each, we will show how and where specific HIPs are incorporated into specific courses, as well as how those experiences are mindfully scaffolded across the 4-year student experience. Finally, we will discuss administrative considerations and challenges for each program.

University at Buffalo's Bachelor of Science in Public Health program

Setting

With more than 32,000 students, the University at Buffalo (Buffalo) is a public research university and member of the Association of American Universities. Buffalo's School of Public Health and Health Professions (SPHHP) was awarded full CEPH accreditation in 2009 and reaccredited in June 2015. SPHHP launched its Bachelor of Science in Public Health (BSPH) program in Fall 2017.

Students

Students can declare the BSPH major as incoming students (both first year and transfer students) or can transfer into the program at a later point in their academic trajectory. All Buffalo undergraduates complete 60 credit hours of general education. Students typically complete the pre-major coursework during their first 2 years of undergraduate study. During this time, students focus on 60 credit hours of university-required academic preparation (UB Curriculum). The UB Curriculum requirements include classes in writing, math and natural sciences that promote quantitative reasoning, diversity, cultural competency, ethical and analytic reasoning, and enhanced communication. Students begin with the UB Seminar, a three-credit course on a topic of their choosing in the first semester of their freshmen year. The course focuses on critical thinking skills and reflective discussion. Students then complete the following: (1) Foundations (building blocks of academic inquiry with an emphasis on communication literacy, quantitative reasoning, scientific inquiry, and diversity),(2) Pathways (a series of thematically linked courses totaling 9 credits and a global pathway, totaling 9 credits), and (3) Capstone (a culminating course, typically in the last year of study, that focuses on connections across academic disciplines). Three required BSPH courses fulfill UB Curriculum requirements. BSPH students pursue an additional 60 credit hours toward the major, including 19 credits outside of public health. These external courses include chemistry, political science, statistics, psychology or sociology, and human physiology. The remaining 41 credits includes introductory coursework, upper-level coursework, nine credit hours of free elective courses, and one four-credit capstone course.

At present, there are approximately 475 BSPH students in the Undergraduate Public Health Program (UGPH). Approximately 35% identify as an underrepresented minority, 75% identify as women, and 26% are first-generation college students. Comparatively, of the overall undergraduate student population at the University at Buffalo in Fall 2021, 24% identified as an underrepresented minority while 19% were first-generation. In addition, 4% are members of the University's Honors College. The official 6-year graduation rates for the program will become available in 2024. However, among the first program cohort ($n = 17$), 100% have completed their BSPH degree.

Faculty

Currently, there are seven full-time clinical assistant professors who teach primarily in the UGPH program. There are also faculty in the SPHHP's Department of Community Health and Health Behavior and Department of Epidemiology and Environmental Health who also cover specific UGPH courses as well as adjunct faculty support from public health researchers and practitioners in the Western New York community.

University of Kentucky's Bachelors of Public Health program

Setting

The University of Kentucky (Kentucky), a Carnegie Research I and a land grant institution, as well as the flagship university for the state, educates over 30,000 students annually. The university is a member of the Southern Association of Colleges and Schools. Kentucky's College of Public Health (CPH) was awarded full CEPH accreditation in 2005 and was

last reaccredited in September 2017. CPH launched its Bachelor of Public Health (BPH) program in Fall 2014.

Students

The BPH is a selective admission program. Students meeting the university standard admission requirement are eligible to declare pre-BPH as their major. Transfer students meeting the program requirements of a 2.75 cumulative GPA and 3.0 program specific GPA are also eligible to declare as pre-BPH majors. Program specific pre-major courses include three public health classes: introductory public health, gerontology, and biostatistics. The final three pre-major required classes include biology, math, and medical terminology. Students typically complete the pre-major coursework during their first 2 years of undergraduate study. During this time, students also focus their study on the 30 h of university required liberal arts core (UK Core), which ensures students are introduced to foundational material across academic disciplines. The UK Core requirements include classes in mathematics, social science, humanities, arts, communication, community citizenship, and global dynamics. Five of the required pre-BPH courses fulfill UK Core requirements. This allows students who do not meet our GPA requirements for admission to still be able to use the courses completed toward another degree program. After successfully completing the pre-major courses and meeting the GPA requirements, students may apply for admission into the BPH program.

The program admits 100–175 students per academic year. Currently there are nearly 180 students in the BPH program, with an additional 110 students declared as pre-BPH majors. The program is popular among underrepresented minority and first-generation students, who make up 22 and 35% of the program student body, respectively. The student body is predominantly female, with 86% of students identifying as such. Comparatively, 17% of the Kentucky undergraduate student body identifies as an underrepresented minority, while 27% are first generation.

Once admitted to the BPH program, students complete 15 credit hours of the BPH Core coursework, followed by an additional 9 h of senior-level required courses. Students are also required to complete 18 h of public health electives. Outside of the required public health courses, students complete 9 h of social science and 6 h of natural science electives. They also complete the Kentucky liberal arts core coursework, a requirement for all Kentucky bachelor degrees. In total, the degree requires a minimum of 120 credit hours. The current 6-year graduation rate for the program is 91%, compared to the University rate of 68%.

Faculty

CPH has two teaching-focused Assistant Professors and one full-time Lecturer that teach exclusively in the BPH program. An additional 7 Assistant Professors, 5 Associate Professors, and 4 Professors regularly teach BPH courses. The college also partners with public health researchers and practitioners from the community to offer topic-specific courses as adjunct faculty.

Course and curriculum design

University at Buffalo's Bachelor of Science in Public Health program

In the design, facilitation, and implementation of the BSPH curriculum at Buffalo, courses were individually and collectively developed with an intentional purpose for active student engagement. Within the 11 HIPs outlined by Kuh (5), the BSPH program at the University at Buffalo incorporates seven practices, outlined below.

Common intellectual experiences

The BSPH curriculum has been designed with an intentional integrative approach instead of a siloed style (16). Rather than following a vertically organized curricular pattern, students approach the BSPH curriculum with an integrative design such that course content is introduced, reinforced, and strengthened throughout their curricular experience.

Writing-intensive courses

Written assignments are included in virtually every BSPH course. Across the curriculum, assignments are designed to teach the value of and skills for writing for different audiences. In addition, upper-division core coursework of includes *Models and Mechanisms for Understanding Public Health (PUB320)* and *Interventions to Improve Public Health Problems (PUB325)*. These courses, taken in sequence, iteratively review key models to explain public health problems (e.g., social ecological model, epidemiologic triad) paired with public health interventions to improve population health and wellbeing. Learning outcomes in both are achieved using a variety of written assignments. In addition, *Introduction to Public Health (PUB101)* includes several small-scale writing assignments to develop academic writing skills.

Collaborative assignments and projects

Within the core BSPH curriculum, coursework includes a range of group activities and assignments. For example, in *PUB320*, students participate on debate teams to apply health behavior change theories to real world public health problems, helping students develop critical thinking skills on theoretical applications for different target populations. Students learn effective team-based, problem-solving skills in *Systems and Policies for Public Health (PUB330)*. In-class learning activities

include a case studies and instructor facilitated discussions where students collaborate in small teams to explore current health policy topics. Finally, students in *Health and Disease: Biological, Personal and Environmental Influences (PUB310)* complete small group, in-class activities using *TopHat*, an interactive learning experiences platform that is seamlessly integrated with the university's course management system.

Undergraduate research

At Buffalo, undergraduate students can take part in research opportunities for course credit, typically in their third or fourth year. Undergraduate research is not a program requirement and does not count as an elective for degree requirements, although it counts toward the minimum 120 credit hours needed for degree completion. Some UG students may take on research opportunities in either paid or volunteer capacities (not for credit) with faculty. There were 15 BSPH students enrolled in independent study or undergraduate research courses in Spring 2022.

Diversity/global learning

BSPH students are encouraged to pursue a wide variety of opportunities to learn with a global lens. First, students take *Global Public Health (PUB210)* to learn about the leading causes of illness, death, and disability globally and the importance of public health approaches to prevention and control of those conditions in resource-constrained settings. Students also learn about the complex interrelationships between social, environmental, structural, and political factors that affect health and wellbeing in low- and middle-income countries. While this course is one of three 200-level electives in the BSPH program, it is offered more frequently than the other 200-level electives. In the Spring 2022 graduating cohort, 81% of BSPH students had completed *PUB210*. Second, students may take part in faculty-led study abroad programs through the SPHHP Office of Global Health Initiatives. In addition, PUB330 includes content on comparative health systems and health policies outside the United States. Finally, Buffalo's general education requirements include a 9-credit "Global Pathway". Students choose one of three tracks—global reflections, language and culture, or international experiences.

Community-based learning

In the BSPH curriculum, experiential learning is a common instructional strategy. Courses give students tools to not simply learn concepts but create effective solutions in their communities. Reflective writing assignments also generate solution-oriented approaches rather than simply a laundry list of public health problems and their underlying behavioral and socio-structural determinants. For example, students in *PUB325* complete a Photovoice project, completing a written assignment and oral presentation about a photograph representing their point of view regarding a public health concern in their community.

Capstone courses and projects

After completing all required public health coursework, BSPH students complete a four-credit capstone experience. *Modern Public Health Problems and Solutions (PUB494)* offers the opportunity to holistically integrate previous public health coursework and out-of-classroom experiences. The seminar-structured course focuses on integrating and synthesizing knowledge gained in the major's core curriculum and using that knowledge to analyze, explain, and address public health problems. Students also gain exposure to how that knowledge is applied in public health practice. The course is centered around student projects based on case studies of public health problems, culminating in a public health problem and solution written assignment with an accompanying oral presentation.

University of Kentucky's Bachelors of Public Health program

Similar to Buffalo, the BPH program curriculum at Kentucky strategically incorporates seven of the 11 HIPs (5). A summary of how these experiences are infused within our courses is summarized below.

Common intellectual experiences

The Kentucky BPH is a selective admission program that incorporates a cohort model for upper division students. In the first academic year following admission into the upper division, students complete five required courses with their cohort. During their senior year, they complete three additional required courses with this group. Cohorts include between 100 and 175 students. Each required course has an enrollment cap of 50 students to help support active learning and collaborative experiences with classes. These upper division classes are restricted to students admitted to the program, so students have the opportunity in these classes to build relationships with members of their cohort.

Since we restrict class size to 50 students, it requires us to offer multiple sections of each required class. This approach means that students do not take every class with the same group of students, but across the final 2 years in the program students will have the majority of classes with a group of students from their cohort. As the program has grown to require multiple sections of each course, we have become mindful of needing to provide additional support to strengthen

the relationships within the cohort outside of the traditional classroom setting. The College is currently working to further support this relationship building between members of a cohort by hosting social events throughout the academic year. We are also piloting study groups among pre-BPH student cohorts to build out those relationships earlier in their academic career.

Writing-intensive courses

Writing is emphasized throughout the Kentucky BPH coursework. The program includes three writing-intensive courses that utilize a Writing Across the Curriculum/Writing Within the Discipline (WAC/WWD) framework to strengthen both academic writing skills and knowledge retention of student learning outcomes (17, 18). Our *Introduction to Public Health (CPH201)* course, which is taken as a pre-major, introduces students to the WAC/WWD model which divides large written assignments into multiple small-scale/low-stakes writing assignments throughout the semester. Students are then provided an opportunity to revise, combine, and resubmit these assignments into a final written product. This pedagogical technique is reinforced in our *Foundations of Health Behavior (CPH44) course*, where over the semester students produce an 18-page, theory-informed health behavior intervention program. Finally, in *Capstone (CPH470)* students apply their knowledge by producing a 25-page case-study assessing a specific community in relation to a public health problem and explore the fit of a particular evidence-based intervention or policy using a systems-thinking approach.

Collaborative assignments and projects

Collaborative projects are emphasized in several courses. While there is some group work is most courses, two courses incorporate a major group assignment as a key course component. In *Fundamentals of Environmental Health (CPH320)* students work in groups to produce a digital documentary investigating a chosen environmental hazard. In *Health Analytics I (CPH330)*, students again work collaboratively to produce a research poster on a selected public health topic. This involves investigating literature on the topic, analyzing statistical relationships, and presenting their findings to their peers and program faculty as a final assignment.

Undergraduate research

The Kentucky BPH offers upper-division students the opportunity to apply for undergraduate research placement. While undergraduate research is not a program requirement, it can be used to fulfill up to six of the required 18 credit hours of public health electives. An undergraduate research director promotes the experience to all students in the program and faculty in the college. Interested students indicate their research interests and preferred level of independent work. Students must complete human subjects research certification to be eligible for placement.

The college historically has had high rates of faculty mentorship each year. Over the previous 3 years, 30 faculty have worked directly with 95 students within the program. The university and college have provided financial support to students to further support undergraduate research projects, including competitive paid research fellowships to students who plan to continue their research following the completion of an independent study experience. Students who receive the CPH research fellowship are required to present their research at one of two research events hosted at the university each spring.

Diversity/global learning

The BPH program requires *A Sick World: Global Public Health in the Early 21st Century* (CPH476G) to ensure all students receive instruction on the global prospective of public health. In addition, the program offers several global-focused electives and study abroad opportunities that can be used to fulfill a portion of the required 18 credit hours of public health elective coursework. The Kentucky BPH program has also infused content on health equity among diverse populations throughout several required courses to ensure students have an opportunity to fully engage with and understand this critical concept. Students are introduced to the topic in *CPH201* and*: Aging in Today's World (GRN250)*. The concepts are reinforced across several core courses including *Foundations of Environmental Health (CPH320)*, *Health Systems and Policy (CPH350)*, and *Foundations of Health Behavior (CPH440)*. This information is then applied throughout *Public Health Practice and Communication* (CPH455) and *Capstone (CPH470)*.

Community-based learning

Several courses in the BPH program incorporate community-based learning. Specifically, CPH440 and CPH470 require students to utilize solution-based approaches to community-specific situations after completing a community assessment. CPH455 requires a 20-h community volunteer experience. Several upper-division electives also include experiential or service-based learning activities.

Capstone courses and projects

CPH470 is the culminating course in the major. Students are required to complete all of the public health core coursework prior to taking Capstone. The course takes a systems-thinking approach and utilizes a WAC/WWD framework, as mentioned above. Students are required to apply knowledge gained throughout the academic program in the completion of this project.

Programmatic scaffolding

Curricular scaffolding in higher education courses and bachelor programs has been found to positively impact learning as it allows students to revisit content, tackle more complex topics, and gain independence in application of critical concepts over time (19, 20). Throughout this section we will explore how the two undergraduate public health programs have incorporated program level scaffolding across the curriculum.

University at Buffalo's Bachelor of Science in Public Health program

The Buffalo BSPH curriculum incorporates academic scaffolding using a two-level approach which maps to HIPs in a vertical fashion. Unlike Kentucky's model, level one includes two parallel tracks (Level 1A and 1B) rather than sequential (see Figure 1). A description of the BSPH program scaffolding and related HIPs are provided below.

At Buffalo, students can enroll in foundational coursework from other disciplines (e.g., political science, chemistry) in tandem with introductory public health coursework. In fact, more students enter the BSPH from other majors than as direct entry, first-year BSPH students. Consequently, a large proportion of new BSPH students have already completed this foundational coursework prior to or in the same semester as *Introduction to Public Health (PUB101)*. One of the five required courses is *Human Physiology (PGY300)*, a four-credit course offered through the Buffalo Jacobs School of Medicine and Biomedical Sciences. One of the required courses is *Statistical Methods (STA119)*, a four-credit course offered in the Biostatistics Department. The remaining courses are offered through the Buffalo College of Arts and Sciences, including *General Chemistry (CHE101), Introduction to American Politics (PSC101)*, and a choice of either an introductory course in Psychology or Sociology. This foundational knowledge is critical as each of these courses is a pre-requisite for the Level Two courses.

PUB101 is the first required writing intensive course in the program. In addition, *Historical and Contemporary Public Health Problems* (PUB102) focuses on diversity- and community-based learning principles from a public health perspective. Students can begin upper-division, Level 2 coursework following pre-requisite course completion in Levels 1A and B. The core curriculum is typically completed in one's junior year and includes five courses, typically completed over two semesters. In addition to common intellectual experiences, students experience writing intensive coursework, community-based learning, and collaborative projects and assignments across several of these courses. The final Level 2 component includes the four-credit capstone course, almost exclusively taken in a student's final semester. The HIPs included in the capstone are writing intensive coursework, diversity and global learning, and capstone projects.

Students are required to complete 15 h of public health electives. These are also leveled, with students required to complete a minimum of six credit hours at the 200-level and nine credits at the 300/400-level. This approach allows students to select lower- and upper-level electives that fit their interests. For example, *Introduction to Epidemiology* (PUB340) is an elective course, covering content beyond the epidemiological concepts in the integrative core courses. The 400-level electives are topic specific (e.g., Public Health Nutrition, Maternal, and Child Health) and provide students choices as they round out their coursework in their final year of study. Finally, students may also select electives that include the HIPs of diversity and global learning, and collaborative assignments and projects. Figure 1 outlines the general structure of the Buffalo BSPH academic scaffolding.

University of Kentucky's Bachelors in Public Health program

The Kentucky BPH program has incorporated academic scaffolding both to increase the rigor of courses and to strengthen student learning. The academic scaffolding includes three primary levels (see Figure 2). Each includes mapped HIPs to ensure students have these experiences throughout the undergraduate program. A summary of each of the three levels and their mapped or optional HIPs are provided below.

Students must first complete six pre-major courses including an introductory course to public health, biostatistics, gerontology, biology, math, and medical terminology. Three of the required courses are offered by CPH include *An Introduction to Public Health* (CPH201) which is the first required writing intensive course in the program. Students also receive foundational knowledge for future undergraduate research experiences in *Statistical Literacy in Public Health* (BST230). Finally, in both CPH 201 and *Aging in Today's World (GRN250)*, students are introduced to concepts of health equity.

The BPH program admits students to upper division once per year, which allows for the incorporation of common intellectual experiences. Following admission, students enter the second level of the academic scaffolding in the major core coursework (i.e., epidemiology, biostatistics, environmental health, heath systems and policy, and health behavior). Students typically take these five courses over their first two semesters in the upper-division program. Beyond common intellectual experiences, students experience writing intensive coursework, diversity, community-based learning, and collaborative learning across these courses.

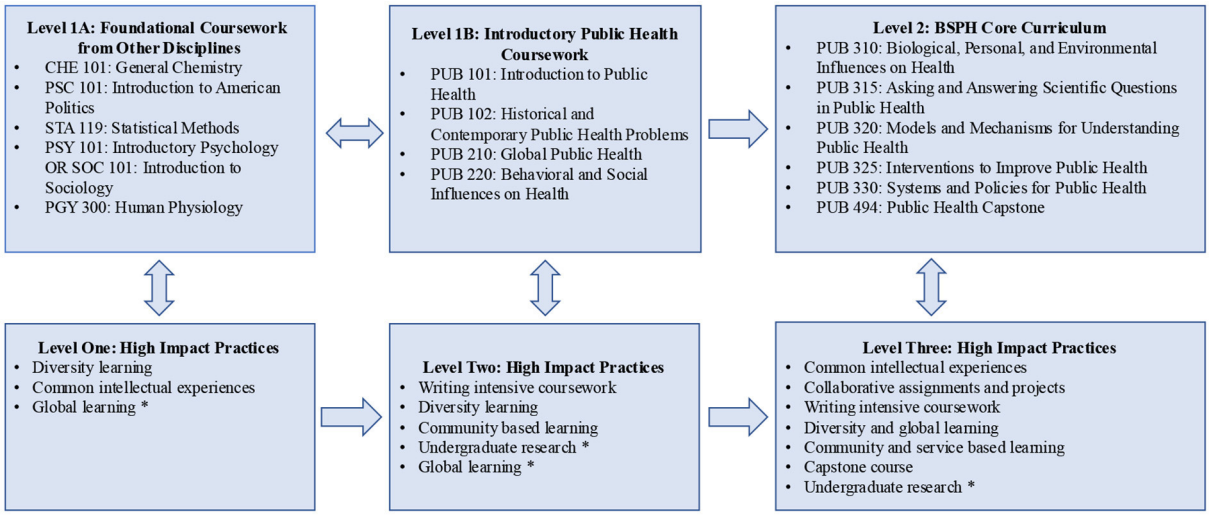

FIGURE 1
University at Buffalo: Bachelor of Public Health program scaffolding and HIPs. * Optional experience based on student selected public health electives.

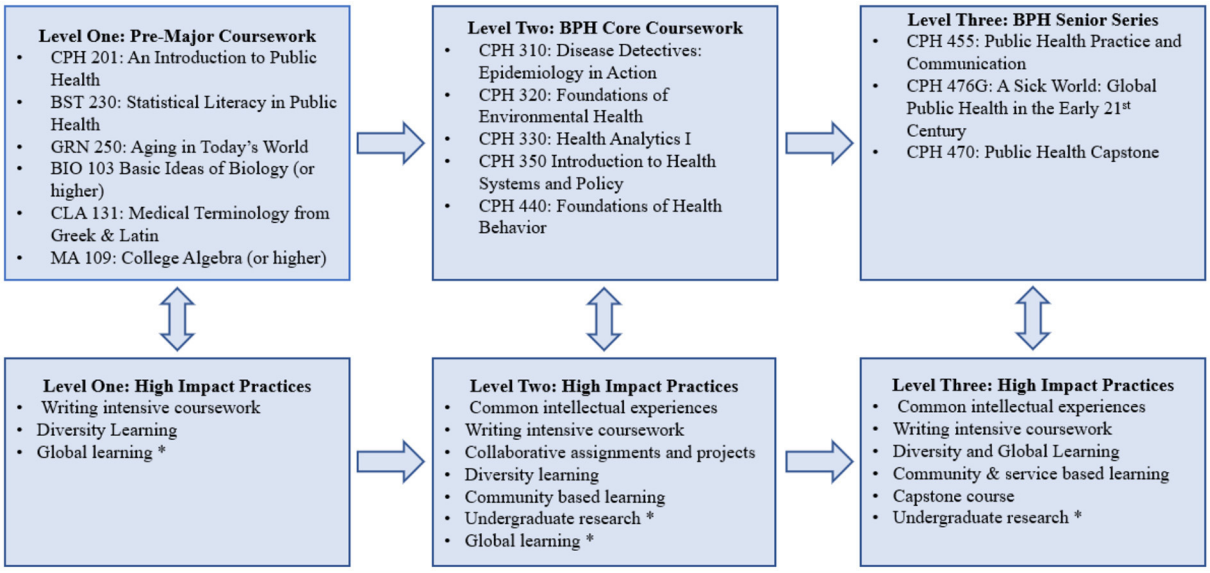

FIGURE 2
University at Kentucky: Bachelor of Public Health program scaffolding and HIPs. * Optional experience based on student selected public health electives.

The final level of academic scaffolding includes three courses typically taken in the student's senior year, including a public health practice and communication course, a global health course, and the program's Capstone. The HIPs included in these three courses are writing intensive coursework, diversity and global learning, service and community-based learning, and capstone projects.

Throughout the program, students are required to complete 18 credit hours of public health electives. These are also leveled, with students required to complete a minimum of six credit hours at each of the 200, 300, and 400 levels. This approach helps to ensure students are given an opportunity to generally explore public health elective coursework early in their academic career while being required to apply higher-level concepts in more rigorous elective courses as they approach

the end of their degree. The majority of the program's 300 and 400 level electives incorporate service or community learning components. Students may also select electives that include the HIPs of undergraduate research, diversity and global learning, and collaborative assignments.

The image below outlines the general structure of the Kentucky BPH academic scaffolding.

Administration

University at Buffalo's Bachelor of Science in Public Health program

The Buffalo School of Public Health and Health Professions established an UGPH Advisory Committee in 2014 to provide administrative structure and support for the BSPH program. This committee includes the UGPH Program Director, Director of Undergraduate Advising, and a faculty representative from each department in the School. As the program has become more established, the frequency of committee meetings has been reduced. As the UGPH program is operationally structured out of the Dean's Office in the School rather than a standalone academic department, the Dean's Office provides ongoing support for faculty recruitment and retention and faculty trainings on pedagogy and teaching effectiveness, including HIPs. Monthly UGPH faculty team meetings, led by the program director, also aid in supporting curricular planning with respect to course scaffolding and delivering high-quality, student-centered learning opportunities.

University of Kentucky's Bachelors in Public Health program

The University of Kentucky College of Public Health developed the Undergraduate Committee (UC) in 2016 to provide administrative structure and faculty oversight for the BPH program. This committee, which includes the Director of Undergraduate Studies (DUS), the Associate Dean of Academic and Student Affairs, the Director of Undergraduate Advising, a faculty representative from each department in the college, and two student members, has been invaluable to the development and management of the program. This collaborative committee took an early lead in the assessment of HIPs in the program, and then worked together with program faculty to strengthen and streamline these components. One way this has been done is by hosting an annual summer workshop for all faculty who teach in the program. This full-day event includes a review of the program curriculum and discussions of the 4-year program structure. It has also included sessions on HIPs, which has helped to strengthen and diversify how and when students encounter these experiences.

Beyond the UC, the Kentucky BPH program has found success through a shared commitment to students and education within the college. CPH has invested in the BPH program and its students through the hiring of three teaching-intensive faculty lines which include protected time to support the BPH program. These faculty positions, which includes the DUS line, have been critical in supporting the program and its faculty. Further, the college has continued to grow and strengthen the number of support staff who work directly with undergraduate students. This financial commitment to dedicated faculty and staff administrative time has allowed for a thoughtful and strategic adoption of the scaffolded, HIPs-focused curriculum.

Program administration considerations

Both universities have developed strong undergraduate academic programs that emphasize the incorporation of HIPs throughout their academic programs. Through thoughtful course design and collaborative planning and implementation, the students from each program will encounter seven unique HIPs prior to graduation.

Undergraduate public health program directors should consider four key points with respect to program administration and the effective utilization of HIPs. First, establishing and reinforcing a culture of openness and communication is essential. Creating shared resources across faculty members (including adjunct instructors) demonstrates the value of community. For example, the Buffalo strategy has included shared electronic resources including syllabi, in-class learning activities, and written assignments. In addition, Buffalo faculty meet monthly to discuss integrative approaches between and across coursework. Similarly, as previously mentioned, Kentucky hosts an annual full day workshop for faculty who teach in the BPH program to collaborate and strengthen the academic experience.

Second, for faculty investment in HIPs to be realized, their keen engagement across the curriculum is consequential. For example, the Buffalo approach has included a recurring rotation of full-time faculty across various courses from introductory to upper-division. Kentucky has addressed this through an investment in full-time faculty lines dedicated specifically to teaching within the BPH program, while rotating in research intensive faculty regularly.

Third, institutional priorities and contexts may influence the extent to which HIPs can be fully implemented. As such, it is important to consider flexible, nimble variations in learning and instruction particularly when circumstances and events necessitate a revision to the original course delivery mode (e.g., transitioning a course from fully in-person to a remote, synchronous method of delivery). Context can also shape decisions about the implementation of HIPs. For

example, some undergraduate public health programs fully incorporate internships into their curricula. At both UK and UB, internships were considered when programs were designed. However, both institutions are situated in mid-sized cities and both already had existing, robust MPH programs with a field experience requirement when the undergraduate programs were created. Given those realities, administration and faculty at both institutions concluded that internships for undergraduates, although pedagogically beneficial, could not be feasibly implemented given the finite number of placement opportunities and the existing needs of each their respective MPH programs.

Finally, planful and systematic implementation of HIPs across an undergraduate curriculum requires equally planful administration and resourcing for the program. From an administrative perspective, both the number of faculty required and the stability with which faculty are teaching courses in the undergraduate program will need to be considered given that overall faculty/student ratios and individual class sizes can both impact the feasibility of implementing HIPs. At UB, this has been primarily accomplished through hiring non-tenure track, teaching-oriented faculty whose job responsibilities are explicitly focused on the undergraduate public health program. At UK, there are not specific faculty identified as undergraduate program faculty, but active efforts have been made to recruit faculty to teach in the undergraduate program and to work with department chairs to ensure continuity of course coverage over time.

In addition, institutional budgetary models need to be leveraged to ensure the ability to successfully implement a HIPs-infused curriculum. At institutions with a responsibility-centered management (RCM) budget model, careful consideration must be given to the balance between the fiscal realities of enrollment and class size as a revenue generator vs. the pedagogical reality that class sizes have an effect on instructor effort and other resources needed to implement HIPs successfully. At institutions with incremental or other budget models, the revenue vs. pedagogy balance may not be as explicit, but the necessity to ensure that fiscal resources for the program are sufficient is no less important. A full discussion of business models for undergraduate public health programs is well beyond the scope of this article (as well as being relatively institution-specific).

Conclusion

Conceptual, logistical, and practical approaches to the integration of HIPs into undergraduate public health curricular design and implementation are important for faculty and administrators at schools and programs of public health who seek to develop new bachelor's degree programs or modify existing programs. Thoughtful, deliberate application and execution of such approaches aid in optimizing the value of HIPs into undergraduate education to best prepare the next generation of public health researchers and practitioners.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

All authors contributed to conceptualization of the manuscript topic, writing of the first draft, editing, and final approval.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

1. US Department of Labor. *College Enrollment and Work Activity of 2016 High School Graduates.* (2017). Available online at: Retrieved from https://www.bls.gov/news.release/archives/hsgec_04272017.pdf

2. Bok D. *Our Underachieving Colleges: A Candid Look at How Much Students Learn and Why They Should Be Learning More-New Edition*, Vol. 50. New Jersey: Princeton University Press (2009).

3. Humphreys D, Davenport A. What really matters in college: how students view and value liberal education. Liberal education & America's promise. *Liberal Educ.* (2005) 91:36–43.

4. Schneider CG. Making excellence inclusive: liberal education and America's promise. *Liberal Educ.* (2014) 100: n4.

5. Kuh GD. *High-Impact Edcuational Practices: What They Are, Who Has Access to Them, and Why They Matter*. Washington, DC: Association of American Colleges and Universities (2008).

6. Finley A, McNair T. *Assessing Underserved Students' Engagement in High-Impact Practices*. Washington, DC: Association of American Colleges and Universities (2013).

7. Felten P, Gardner JN, Schroeder CC, Lambert LM, Barefoot BO, Hrabowski FA. *The Undergraduate Experience: Focusing Institutions on What Matters Most*. John Wiley & Sons (2016).

8. American Association of Colleges and Universities. *The LEAP Vision for Learning: Outcomes, Practices, Impact, and Employers' Views*. Washington, DC: American Association of Colleges and Universities (2011).

9. Bass SB, Scarpulla MC, Patterson F, Watts SO, Twersky S. Integrating liberal arts learning outcomes in the development and implementation of a multisection undergraduate public health capstone course. *Pedag Health Promot.* (2016) 3:16–22. doi: 10.1177/2373379916670657

10. Kiviniemi MT, Mackenzie SLC. Framing undergraduate public health education as liberal education: who are we training our students to be and how do we do that? *Front Public Health.* (2017) 5:9. doi: 10.3389/fpubh.2017.00009

11. Rozier M, Scharff D. The value of liberal arts and practice in an undergraduate public health curriculum. *Public Health Rep.* (2013) 128:416. doi: 10.1177/003335491312800515

12. Stoots JM, Wykoff R, Khoury A, Pack R. An undergraduate curriculum in public health benchmarked to the needs of the workforce. *Front Public Health.* (2015) 3:12. doi: 10.3389/fpubh.2015.00012

13. Wykoff R, Khoury A, Stoots JM, Pack R. Undergraduate training in public health should prepare graduates for the workforce. *Front Public Health.* (2015) 2:285. doi: 10.3389/fpubh.2014.00285

14. Gebbie K, Rosenstock L, Hernandez LM. *Who Will Keep the Public Healthy. Educating Public Health Professionals for the 21st Century*. Washington, DC: Institute of Medicine (2003).

15. Petersen DJ, Albertine S, Plepys CM, Calhoun JG. Developing an educated citizenry: the undergraduate public health learning outcomes project. *Public Health Rep.* (2012) 128:425–30. doi: 10.1177/003335491312800517

16. Kiviniemi MT, Przybyla SM. Integrative approaches to the undergraduate public health major curriculum: Strengths, challenges, and examples. *Front Public Health.* (2019) 7:106. doi: 10.3389/fpubh.2019.00106

17. Hilgers TL, Hussey EL, Stitt-Bergh M. "As you're writing, you have these epiphanies" what college students say about writing and learning in their majors. *Written Commun.* (1999) 16:317–53. doi: 10.1177/0741088399016003003

18. Reynolds JA, Thaiss C, Katkin W, Thompson Jr RJ. Writing-to-learn in undergraduate science education: a community-based, conceptually driven approach. *CBE Life Sci Educ.* (2012) 11:17–25. doi: 10.1187/cbe.11-08-0064

19. Devereux L, Wilson K. Scaffolding literacies across the Bachelor of Education program: an argument for a course-wide approach. *Asia-Pacific J Teach Educ.* (2008) 36:121–34. doi: 10.1080/1359866080197 1633

20. Doo MY, Bonk C, Heo H. A meta-analysis of scaffolding effects in online learning in higher education. *Int Rev Res Open Disturb Learn.* (2020) 21:60–80. doi: 10.19173/irrodl.v21i3.4638

frontiers | Frontiers in Public Health

TYPE Curriculum, Instruction, and Pedagogy
PUBLISHED 05 October 2022
DOI 10.3389/fpubh.2022.992835

OPEN ACCESS

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SPECIALTY SECTION
This article was submitted to Public Health Education and Promotion, a section of the journal Frontiers in Public Health

RECEIVED 13 July 2022
ACCEPTED 15 September 2022
PUBLISHED 05 October 2022

CITATION
Minlikeeva AN, Amato KA and Przybyla SM (2022) Modern public pealth problems and solutions: An undergraduate capstone course to prepare the next generation of public health practitioners to enhance health equity.
Front. Public Health 10:992835.
doi: 10.3389/fpubh.2022.992835

Modern public pealth problems and solutions: An undergraduate capstone course to prepare the next generation of public health practitioners to enhance health equity

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With a growing emphasis on health equity in public health practice and research, ensuring a competent and skilled public health workforce is critical to advancing the public health mission of a healthier nation. The expansion of undergraduate public health programs provides a unique opportunity for more extensive training and education of the next generation of public health professionals and to center undergraduate public health education around the need to be competent in addressing health disparities to achieve health equity. Following national accreditation standards set by the Council on Education for Public Health (CEPH), undergraduate Bachelor of Public Health (BSPH) students at the University at Buffalo (UB) must complete a capstone course before graduation. This course focuses on integrating and synthesizing knowledge acquired from the BSPH core curriculum through analysis, explanation, and addressing public health problems *via* an interdisciplinary approach. We designed the most recent iterations of the capstone class based on the model that includes cross-cutting skills as defined by CEPH, evidence-based decision-making skills, established learning objectives of the course, and centering on health equity. This course also builds on the students' previously acquired knowledge with an ultimate goal to prepare the graduating seniors for the "real world" health equity-related public health activities. As a part of the coursework, students complete case studies, article reviews, and active learning group activities that target each component of the model. The final products of the course are a synthesis paper and oral presentation based on a public health problem as identified through surveillance data, analyzing causes of this problem, identifying critical stakeholders, creating an

evidence-based solution to the problem, and explaining how health inequities may be addressed through the proposed solution. Centering the culminating course for BSPH undergraduate students on health equity will help ensure a competent and skilled workforce, informed by accreditation standards and prepared to lead our national public health goal of improved and equitable population health.

KEYWORDS

capstone course, undergraduate public health education, bachelor of science public health, health equity, public health workforce

Introduction

Recently there has been a considerable shift toward health equity being a central theme of public health-related activities. Achieving health equity and addressing health disparities to improve people's health are the main goals of Healthy People 2030 (1). Similarly, the most recent version of the Essential Public Health Services was centered around the theme of health equity (2). The practical implications of these initiatives are reflected in the work of the leading public health agency in the country, the Centers for Disease Control and Prevention, being oriented around health equity (3).

The expansion of undergraduate public health programs provides a unique opportunity for more extensive training and education of the next generation of public health practitioners. As such, schools and programs of public health have a prime opportunity to center undergraduate public health education around themes that reflect modern public health practice, which includes emphasizing the critical role of health equity. In the capstone course of the BSPH program, we structured the coursework around a model that prepares the graduating seniors to participate in the important task of achieving health equity by targeting the cross-cutting skills developed and required by the Council on Education for Public Health (CEPH) and using the coursework as a mode of exposing the students to these concepts (4).

Background and course rationale

The Undergraduate Public Health Program in the School of Public Health and Health Professions at the University at Buffalo (UB) started in 2017 and has considerably expanded over the years (5). The curriculum of the Bachelor of Science in Public Health (BSPH) program is based on an interdisciplinary approach that integrates five foundational public health disciplines in each core course of the curriculum (5). The details of this program and, specifically, the structure of the interdisciplinary curriculum have been described elsewhere (5). Briefly, the program has seven required courses: PUB 101- Introduction to Public Health, PUB 102- Historical and Contemporary Public Health Problems, PUB 310-Health and Disease: Biological, Personal, and Environmental Influences, PUB 315- Asking and Answering Scientific Questions in Public Health, PUB 320- Models and Mechanisms for Understanding Public Health, PUB 325- Interventions to Address Public Health Problems, PUB 330- Public Health Systems and Policies, and five elective courses (two at the 200-level and three at the 300/400-level). In the final semester of study, all BSPH students also complete PUB 494- Modern Public Health Problems and Solutions. The core public health courses correspond to the Public Health Bachelor's Degree Foundational Domains and Foundational Competencies and incorporate the Public Health Bachelor's Degree Cross-Cutting Concepts and Experiences required by CEPH (4, 5).

The students also have to complete additional coursework that includes a Communication Literacy course and some courses from other disciplines (5, 6). The structure of the program is built on the integration of the five main public health disciplines across the core courses (5). The interdisciplinary nature of the BSPH program prepares the students to establish and develop the knowledge and skills required to understand and analyze complex public health problems and develop solutions to address these problems using a "real world" approach (5).

The capstone course, PUB 494: Modern Public Health Problems and Solutions, is a four-credit course that represents one of the pivotal components of the BSPH curriculum (5). The course satisfies the D11 CEPH requirement, according to which the students "have opportunities to integrate, synthesize and apply knowledge through cumulative and experiential activities"(4). More specifically, in this course, the students have to demonstrate their ability to integrate and synthesize knowledge obtained from the public health curriculum and use that knowledge to analyze, explain, and address various public health problems (5).

10.3389/fpubh.2022.992835

TABLE 1 Characteristics of graduating seniors of the BSPH program taking the capstone course in the spring 2022, $N = 80$.

Characteristics	*N* (%)
Gender	
Female	61 (76.2)
Male	17 (21.2)
Other	2 (2.5)
Age (mean), years	22
Race	
White	48 (60.0)
Black/African American	13 (16.2)
Asian	12 (15.0)
American Indian/Alaskan Native	1 (1.3)
Decline to answer/unknown	6 (7.5)
Ethnicity	
Hispanic	9 (11.3)
Non-Hispanic	69 (86.2)
Decline to answer	2 (2.5)
Plans after graduation	
Continuing education	44 (55)
Enter the workforce	18 (22.5)
To be determined	9 (11.3)
Taking a break	9 (11.3)

The first offering in this course occurred in Spring 2019 with 17 students enrolled in this course. Over time, as the program expanded, the number of students enrolled in this course also increased. In Spring 2022, there were 102 students registered for this course, with four sections. This course is also offered during the Fall and Summer terms.

Pedagogical framework

The capstone course enrolls students with diverse backgrounds and different career plans. In Spring 2022, to gather more information on the career plans of the graduating seniors of the BSPH program, we conducted an anonymous, self-administered survey. Survey results (response rate=78.4%) demonstrated racial and ethnic diversity in the sample, with 60 %White, 16.2% Black or African American, and approximately 11% indicating their ethnicity as Hispanic (Table 1). These numbers are very similar to the results of the most recent "Public Health Workforce Interests and Needs Survey: PH WINS" that was conducted among state and local public health workers in 2017. Based on this survey, the PH workforce is 59% of White, 15% Black or African American, and 13% Hispanic or Latino (7).

In our sample, when asked about plans after graduation, more than half (55%) of students were planning to continue their education, while 22.5% indicated that they plan to enter the workforce, while more than ten percent (11.3%) said that their plans are not definite, and another 11.3% indicated that they would be taking a break (Table 1). Out of those who intended to continue their education, the majority of students were planning on pursuing the MPH degree or the Public Health Certificate Program. Some students indicated their interest in pursuing a degree in a health-care-related field such as nursing, while others were also interested in exploring other master's level degrees. Such a variety of potential career paths is not surprising as it reflects the multidisciplinary nature of public health (8).

Course model

The coursework structure is reflected in the model depicted in Figure 1. This model originated from Randall Andreasen's work which described a Model for the Integration of Experiential Learning into Capstone Courses utilized in the College of Agriculture Capstone Courses (9). We adapted this model to be utilized in our course and modified it to reflect the focus of our class on the CEPH requirements described above and the overall public health focus on health equity (Figure 1). In addition, the model also incorporated the multidisciplinary structure of public health and accommodated skills needed for various career paths considered by the BSPH graduates. More specifically, the course targets several cross-cutting areas that are important for future professional success: professionalism, personal work ethic, networking, teamwork and leadership, and critical thinking (4). Another component targeted by this model is evidence-based decision-making skills. Emphasis on evidence-based practice and mastery of evidence-based decision-making skills is particularly important in this context, considering the leading role of scientific evidence in public health practice (10) and the emphasis of the use of evidence-based interventions and strategies to achieve health equity by Healthy People 2030 (1).

Another component integrated into the coursework is the course learning objectives (Figure 1) which include the following: (1) describing the connections between understanding of and solutions to public health problems, (2) explaining how evidence-based practice is implemented across the ten essential public health services (EPHS), (3) describing how the knowledge base of public health is used by "real world" public health practitioners, and (4) applying the knowledge base from the major core curriculum to comprehensively analyze, explain, and develop a plan to address a public health problem. The latter is directly related to the CEPH requirement for the capstone course in undergraduate public health programs.

Finally, another component that becomes a significant part of this model is its emphasis on health equity. While this concept is addressed in part by the second learning objective of the course as part of the ten EPHS, in this model, we decided to distinguish

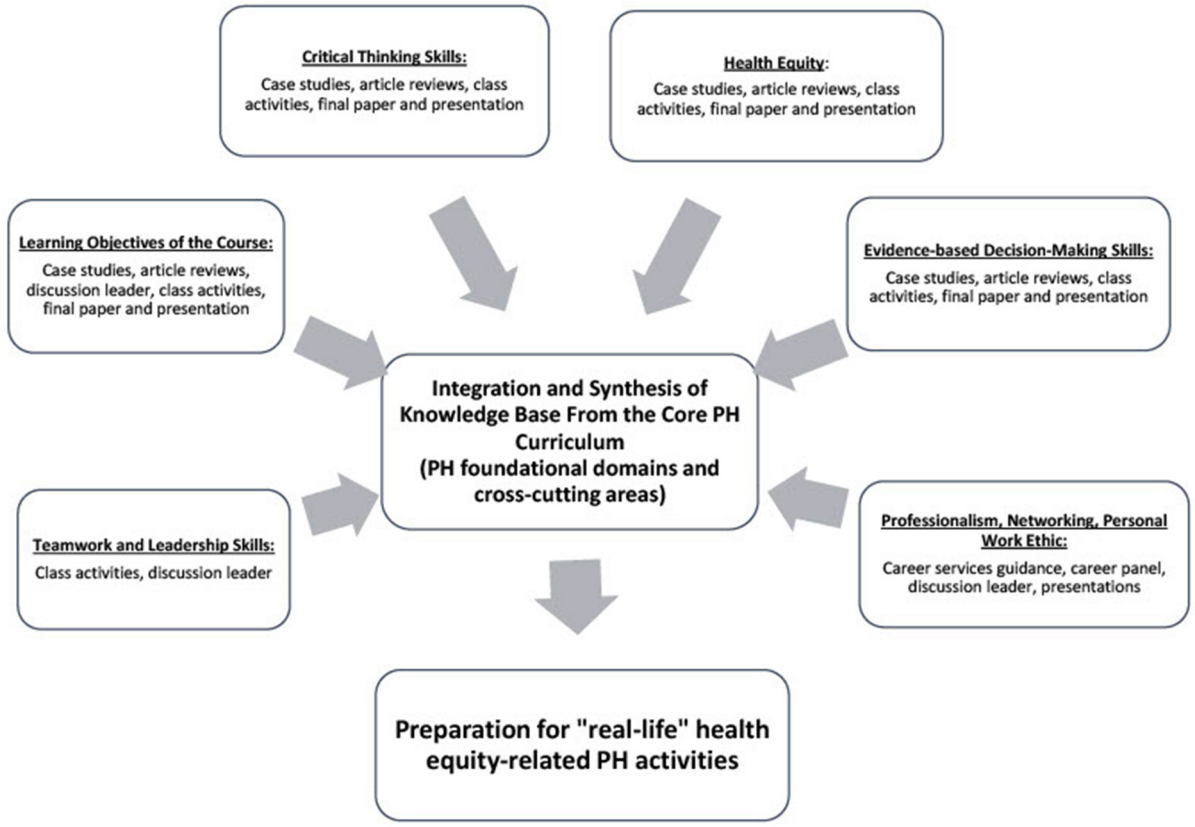

FIGURE 1
Model utilized in the modern public health problems and solutions class*. Adapted from Andreasen (9).

this concept from the learning objectives and separate it into a distinct component of this model.

To fulfill the CEPH requirements for the course, these components of the model are aligned around the integration and synthesis of knowledge gained in the major core public health curriculum. To accomplish this goal, each component of the model also includes the methods of evaluating students' achievements presented by case studies, article reviews, class activities, leading discussions, and final paper and presentation. The description of the "Professionalism, networking, and personal work ethic" component also includes career panel and career services guidance. These will be described in the next section of the paper.

To reflect the overall goal of public health initiatives and the need for the public health workforce to be knowledgeable in health equity, the building blocks of the model listed above are all connected to the final component titled "preparation for health equity-related public health activities" which emphasizes the special role of health equity topic in this course.

Pedagogical format

Professionalism, networking, and personal work ethic

The first part of the course aims to address the students' different needs and career-related aspirations because of the variety of different career and professional paths considered by the students. Specifically, to prepare the students for the next step after graduation and address the issue of preparation for future career requirements, the course starts with a series of career development workshops in which the career services representatives provide guidance on topics such as networking, job searching, interviewing, and job negotiation skills. During these talks, the importance of one's personal work ethic is also highlighted. The students are provided information on resume, CV, and cover letter writing as well as guidance on professional communication. The students are also linked to the UB Career Design Center, where they can utilize the services and tools available to them to prepare for the next steps after graduation beyond what has been discussed in the classroom.

Students also interact with a public health practitioner career panel, which consists of recent alumni of the BSPH program at UB, graduate students currently enrolled in various concentrations of the MPH degree, and public health professionals with MPH degrees. During the session, the panelists share their post-graduation and work-related or classroom experiences and answer questions regarding topics such as future career steps, the importance of networking, professionalism, and a strong work ethic.

Learning objectives of the course, evidence-based decision-making skills, and health equity

In capstone, the coursework integrates the knowledge and experiences acquired by the students in the previous classes that target various public health foundational domains, foundational competencies, and cross-cutting concepts and experiences. The students start the class equipped with the foundational public health-related knowledge from other public health courses that include but are not limited to the topics related to quantitative and qualitative research methods, public health biology, behavioral models, social determinants of health, health policies and laws, planning and implementation of public health interventions, and searching for and evaluation of peer-reviewed literature related to public health content.

Throughout the semester, the students are exposed to multiple activities, case studies, and articles assigned by the instructors. To be aligned with the learning objectives of the course and centered on health equity, the class activities and assignments are structured around the revised 2020 version of the ten Essential Public Health Services (EPHS) (2). Each week, one of the ten EPHS and a corresponding function of public health becomes the main topic for course-related activities and assignments. Students complete case studies, article reviews, and active learning class activities related to this EPHS. When completing each of these assignments and activities, students are exposed to discussion and detailed analysis of various public health problems that focus on infectious and chronic diseases, health-related behaviors, and environmental issues and public health-related solutions that include interventions, policies, and programs. Particular attention is devoted to discussing the role of stakeholders involved in the problem and solution of this problem and the interaction of these stakeholders during the implementation phase of the solution. Such detailed focus on each EPHS and public health efforts to maintain these EPHS improves the understanding of the practical implications of EPHS and a corresponding public health function. It also increases awareness of the role of evidence-based practice in public health and strengthens evidence-based decision-making skills. For example, when working on one case study focused on chronic disease, the students were asked to explain how evidence was used in this case study to understand the problem, create the solution, guide the decision on what stakeholders to involve in the solution to the problem and evaluate the results of a specific intervention based on available evidence (11).

Besides being focused on the EPHS, one of the main themes that become a centerpiece of these assignments and discussions is health equity. For each assignment, students demonstrate their knowledge of health equity and explain how each of the discussed scenarios and each EPHS is linked to health equity. The students also explore the absence of health equity, how the EPHS can help address health inequities, and creating solutions aligned with the EPHS to address health inequities. Such a structure allows students to practice approaching different public health problems and their solutions through a health equity lens.

Teamwork and leadership skills

Another aspect targeted by the coursework is the mastery of teamwork and leadership skills. During the semester, the students work on these skills through the activity titled "discussion leader." This activity is represented by the weekly team-based presentations developed and led by the students. At the start of the semester, students are divided into groups within which the team members collaborate on preparing a presentation related to a case study or an article assigned for that week. Each week, one team leads a presentation and the class discussion based on the assignment centered on one of the EPHS discussed that week. Again, health equity becomes one of the main themes emphasized during these discussions. Leading the discussion allows the students to collaborate on a common task as a team, learn from each other, and advocate for disadvantaged populations. These activities also target the "Professionalism, networking, and personal work ethic" component of the model by letting the students practice their professional communication and presentation skills.

Critical thinking skills

Working on the class assignments, participating in class activities, and leading the discussions with the focus on the ten EPHS and health equity, evidence-based practice, analysis of various public health problems, their causes and solutions, and creating new solutions to existing problems allows for a gradual mastery of critical thinking and problem-solving skills over the course of the semester. Analysis of various real-life problems allows the students to distinguish the role of behavioral, social, and environmental factors on the health status of selected populations. Weekly, the instructor provides written feedback on the extent to which students sufficiently addressed

the questions related to the aspects mentioned above, which helps them to gradually build the skills necessary to work on the final class project.

All the components of the model discussed above, when combined and incorporated in the classroom, allow the demonstration of knowledge from various public health-related disciplines and the integration of this knowledge. Specifically, case studies, article reviews and class activities and discussions demonstrate the relatedness of the concepts from various public health domains. Examination of a central issue, problem, or topic allows the students to strengthen their ability to connect the concepts from more than one discipline and practice synthesis skills (12). Such an approach reflects the interdisciplinary nature of the BSPH program that focuses on students' exposure to a less fragmented and more cohesive educational process (12). Moreover, it promotes mastery of knowledge related to public health domains and cross-cutting areas and understanding of the relationship between public health theory and practice.

Public health problem and solution paper and presentation

The final assignment, titled Public Health Problem and Solution Paper is the culmination of students' learning experiences in the BSPH program. This assignment being a part of the capstone course stands separately from all the other assignments as, according to the American Association of Colleges and Universities standards, it represents an example of high-impact educational practices (13). In this capstone course, this assignment consists of the following parts: each student selects a public health problem, describes the scope of the problem, identifies the population affected by this problem, analyzes causes of this problem, identifies stakeholders relevant to that problem and proposed solution, and proposes a public health solution to address this problem with the explanation of how this solution would be incorporated within the public health and/or healthcare delivery system. Moreover, in the Public Health Problem and Solution paper, each student needs to emphasize how this particular solution would address health disparity affecting the population that they identified and promote health equity.

The students start working on the final project early in the semester by selecting a topic that interests them. The selection of a topic is driven by the availability of public health surveillance system created to gather the data on this particular topic. The data generated by the surveillance system and which the student is planning to use has to be recent and provide information regarding the distribution of this problem in a specific population. This requirement results in a more thorough approach by the student when selecting the topic. Even if the topic interests the students, the availability of a public health surveillance system that exists to assess the problem is the limiting factor that requires further research. As a result, the students might change their initial topic to another in order to address this requirement.

Once the instructor approves the topic, the students move to the next stage of this project- creating an outline of the final paper in which the students have to provide the main details of each part of the paper listed above. During this stage, the instructor assesses the students on how well each component of each part of the paper relates to the overall topic and how well these components are aligned with one another. Students might need additional guidance regarding the proposal of the solution that addresses the selected problem. This is quite understandable considering the fact that creating a solution corresponds to the very last category of the cognitive process dimension of the revised Bloom's taxonomy, which tends to be more cognitively complex compared to lower levels (14). At the same time, the students are expected to synthesize previously learned knowledge into a new product (14). For this reason, constructive feedback from the instructors and some suggestions regarding the feasibility of a proposed solution and its link to the preceding parts is necessary for the students to navigate this part of the final paper.

Another part that could be somewhat challenging for the students to describe is how the solution that they proposed would be incorporated within the public health and/or healthcare delivery system, given the "complexity of designing and delivering public health services." (15) Again, weekly assignments, class activities and discussion and the instructors' emphasis on details of utilization of public health and healthcare delivery system to implement various solutions provided in the description of the case studies and articles help the students to notice these important details and use similar techniques when describing the implementation of their solutions. Another useful tool that helps the students to think through the details of the implementation of their solutions is creating diagrams and chronological timelines of the situations described in the case studies and articles. Such techniques guide students in identifying the elements of the delivery system necessary to integrate the solutions proposed in the case studies and articles and visualize the links among these elements.

In the final class product, the students have to demonstrate the ability to select and describe a problem using existing data, identify the population affected by this problem, analyze the causes of the problem supporting their claims with scientific literature, describe the role of each of the identified stakeholder related to the problem and its solution, create a public health solution based on evaluation of the existing evidence of a previously created functional solution, and evaluate the created solution in relation to how it addresses health disparity and health equity concept. Using a detailed rubric, students are assessed on

how well each of these parts is addressed in the paper and how well these parts are linked together into one cohesive paper.

At the end of the semester, the students also create PowerPoint presentations containing the main points of their papers and deliver an oral presentation to their peers. This assignment further masters the skill of professional communication by presenting the information to a larger audience. The students are then assessed based on the quality of the presentation of the content of the final paper and their public speaking skills.

As described in Figure 1, the Public Health Problem and Solution assignment aligns with the model utilized in this course. The students master the skills to interpret quantitative data and utilize scientific evidence to develop a public health-related solution, further explore EPHS, specifically EPHS #1 and #5 and explain how evidence is utilized across the EPHS, and further explore the concept of health equity. By working on this paper, students continue mastering critical thinking and problem-solving skills and move beyond basic levels of the revised Bloom's Taxonomy to the highest, most challenging level. Finally, aligned with the main model in this class, the students demonstrate their ability to synthesize and integrate knowledge acquired from the core public health courses.

Discussion

Being a course in which the "students have opportunities to integrate, synthesize, and apply knowledge through cumulative and experiential activities," (4) the capstone experience offers a unique way to strengthen the knowledge and skills acquired by the students throughout the program. With different capstone courses described in the literature (16–18), the Modern Public Health Problems and Solutions course in the BSPH program at the University at Buffalo specifically prepares the students to target health disparities by mastering the students' ability to rely on evidence-based practices mastering the cross-cutting skills identified by CEPH, therefore, contributing to the knowledge base for the design of future courses of similar nature. The course capitalizes on achieving health equity through addressing health disparities, an essential skill for public health professionals. Together with the class activities, case studies, article reviews, and the Public Health Problem and Solution paper and presentation help prepare the students to address "real world" issues when they become public health professionals.

We also recognize some challenges that exist in preparing the students for the "real world" challenges. First, some students had difficultly and needed additional guidance with linking the parts of the final paper together in one logical framework. We are planning on addressing this issue by including the tool that would encourage systems thinking approach (4). Based on the CEPH criteria, such tools could include a concept map that would visualize the complicated connections between the causes of a public health problem, stakeholders, parts of the public health or health care-related delivery system, and the health equity concept.

To make the class environment more supportive, similarly to the capstone course at the University at Albany (18), we offered office hours as an additional support option for students who had some difficulty while working on the class assignments. In addition, to promote equity within the classroom, we also utilized the Transparency in Learning and Teaching (TILT) templates (19) to organize the description of the assignments in this class. Transparent instructions with a formulated goal of the assignment and its relevance for students' classroom experience have been shown to be highly beneficial for students' success, particularly for underrepresented students and students with a disadvantaged background (20). Knowing the goal of each assignment and its relevance increased the engagement of students with the class material and made each assignment more focused. We are planning to continue using these templates in this course as its utilization, together with the class model, helped the students gradually develop and master the skills of integration and synthesis of previously acquired knowledge.

Conclusion

To accomplish the fundamental task of achieving health equity, public health programs should focus their training of the next generation of public health professionals on recognizing the presence or lack of health equity and developing and mastering the ability to participate in the efforts to address the needs of disadvantaged populations. To be able to face challenges when pursuing this important goal, that the graduates of public health programs should be knowledgeable not only about the discipline-related concepts but also be able to interpret scientific evidence, utilize evidence-based strategies to address public health problems, have strong teamwork, leadership, professional communication, critical thinking, and problem-solving skills. We are optimistic that our experience of framing the capstone course will serve as an example for similar courses in other undergraduate public health programs. Centering the coursework on mastering these skills as well as prioritizing the role of health equity in public health activities will prepare a competent and skilled workforce ready to lead the national public health goal of improved and equitable population health.

Data availability statement

The original contributions presented in the study are included in the article/supplementary files, further inquiries can be directed to the corresponding author/s.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements.

Author contributions

AM and KA were the instructors for the Modern Public Health Problems and Solutions course. SP is the Assistant Dean, Director for Undergraduate Public Health Programs who oversees the Capstone course. All authors directly contributed to the development, writing, and review of the manuscript.

Acknowledgments

The authors of this manuscript would like to thank BSPH students and faculty and staff in the Undergraduate Public Health Program.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

1. USDHHS. *Health Equity in Healthy People 2030*. Available online at: https://health.gov/healthypeople/priority-areas/health-equity-healthy-people-2030 (accessed May 11, 2022).

2. CDC. *10 Essential Public Health Services 2020*. Available online at: https://www.cdc.gov/publichealthgateway/publichealthservices/essentialhealthservices.html (accessed on March 18, 2021).

3. CDC. *Health Equity 2022*. Available online at: https://www.cdc.gov/chronicdisease/healthequity/index.htm (accessed June 6, 2022).

4. CEPH. *Accreditation Criteria: Schools of Public Health & Public Health Programs 2021*. Available online at: https://media.ceph.org/documents/2021.Criteria.pdf (accessed June 11, 2022).

5. Kiviniemi MT, Przybyla SM. Integrative approaches to the undergraduate public health major curriculum: strengths, challenges, and examples. *Front Public Health*. (2019) 7:106. doi: 10.3389/fpubh.2019.00106

6. SPHHP. *Requirements and Curriculum*. Available online at: https://publichealth.buffalo.edu/home/education/undergraduate-and-minors/public-health/requirements-and-curriculum.html (accessed June 9, 2022).

7. de Beaumont Foundation and Association of State and Territorial Health Officials (ASTHO). *Public Health Workforce Interests and Needs Survey: 2017 Findings*. Available online at: https://phwins.org/most-recent-findings/ (accessed June 20, 2022).

8. Turnock BJ. *Public Health: What it is and How it Works. Sixth edition*. Burlington, Massachusetts: Jones & Bartlett Learning (2016).

9. Andreasen RJ. Integrating experiential learning into college of agriculture capstone courses: implications and applications for practitioners. *NACTA J*. (2004) 48:52–7.

10. Brownson RC, Fielding JE, Maylahn CM. Evidence-based public health : a fundamental concept for public health practice. *Annu Rev Public Health*. (2009) 30:175–201. doi: 10.1146/annurev.publhealth.031308.100134

11. Hunting K, Gleason BL. *Essential Case Studies in Public Health: Putting Public Health into Practice. 1 ed*. Burlington, MA: Sudbury Jones & Bartlett Learning, LLC (2011).

12. Jacobs HH. *Interdisciplinary Curriculum: Design and Implementation*. Alexandria, Virginia: ASCD, Association for Supervision and Curriculum Development (1989).

13. AAC&U. *High-Impact Practices 2022*. Available online at: https://www.aacu.org/trending-topics/high-impact (accessed June 13, 2022).

14. Anderson KDR. *A Taxonomy for Learning, Teaching, and Assessing : A Revision of Bloom's Taxonomy of Educational Objectives*. Pearson; 1st edition (December 19, 2000) (2001), 336.

15. Liburd LC, Hall JE, Mpofu JJ, Williams SM, Bouye K, Penman-Aguilar A. Addressing health equity in public health practice: frameworks, promising strategies, and measurement considerations. *Annu Rev Public Health*. (2020) 41:417–32. doi: 10.1146/annurev-publhealth-040119-094119

16. Chorazy ML, Klinedinst KS. Learn by doing: a model for incorporating high-impact experiential learning into an undergraduate public health curriculum. *Front Public Health*. (2019) 7:31. doi: 10.3389/fpubh.2019.00031

17. Harver A, Zuber PD, Bastian H. The capstone eportfolio in an undergraduate public health program: accreditation, assessment and audience. *Front Public Health*. (2019) 7:125. doi: 10.3389/fpubh.2019.00125

18. Fitzpatrick VE, Mayer C, Sherman BR. Undergraduate public health capstone course: teaching evidence-based public health. *Front Public Health*. (2016) 4:70. doi: 10.3389/fpubh.2016.00070

19. TILT HE. *TILT Higher Ed Examples and Resources*. Available online at: https://tilthighered.com/tiltexamplesandresources (accessed June 13, 2022).

20. UNLV. *Recent Findings: Transparency in Learning and Teaching in Higher Education 2015*. Available online at: https://www.unlv.edu/sites/default/files/page_files/27/Provost-TILT-ResearchSummary.pdf~

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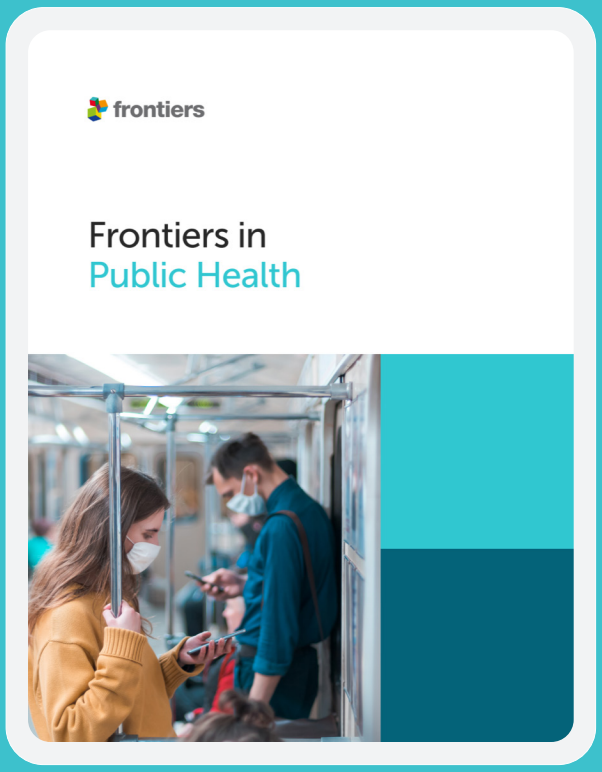

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