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TEACHING TIPS & TOOLS

Instruction Model Using Collaborative Tools That Promote Competence Attainment in a Health Professions Graduate Program

ROSEMARY M. CARON, PhD, MPH

ABSTRACT

Competency-based education is widespread in graduate public health and health administration programs. The Council on Education in Public Health (CEPH) amended its criteria for accreditation with more of an emphasis on skills-based curricula as opposed to solely a knowledge-based curricula so graduates would be ready to join the workforce with the requisite knowledge and skills. The purpose of this article is to describe two tools that promote select CEPH competence attainment via collaborative online pedagogical approaches. Specifically, the assignments utilizing these tools were designed to: (1) curate and evaluate primary resources for a selected health issue; (2) develop questions based on the research and information presented; and (3) communicate discipline-specific research in a concise, professional manner to the general population. The foundational CEPH competencies these assignments addressed include: evidenced-based approaches to public health, planning and management to promote health, policy in public health, and communication. As today's health professions students come to our educational programs from diverse professional backgrounds with varying levels of expertise, understanding how research and practice inform each other and how this relationship affects their daily work is an essential element that can be transported from one position to the next over the course of a career.

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INTRODUCTION

The Council on Education in Public Health (CEPH) is “an independent agency recognized by the U.S. Department of Education to accredit schools of public health, and public health programs outside schools of public health” (CEPH, 2019a). CEPH’s goals are as follows:

- to promote quality in public health education through a continuing process of self-evaluation by the schools and programs that seek accreditation;
- to assure the public that institutions offering instruction in public health have been evaluated and judged to meet standards essential for the conduct of such educational programs; and
- to encourage—through periodic review, consultation, research, publications, and other means—improvements in the quality of education for public health (CEPH, 2019a)

Although accreditation is not required, many programs and schools of public health seek this recognition that their educational offerings are meeting standards set by CEPH. This standardization of education is important for the preparation of health professionals who will work in various entities at the local, state, national, or global levels to fulfill the public health mission of preventing disease, promoting health, and protecting the health of populations via providing essential public health services to the communities they serve (CDC, 2019).

Bennett and Walston (2015) state that competency-based education (CBE) “is the present and future of public health education.” CEPH states that CBE “is an institutional process that moves education from focusing on what academics believe graduates need to know (teacher-focused) to what students need to know and be able to do in varying and complex situations (student and/or workplace focused). CBE is focused on outcomes (competencies) that are linked to workforce needs, as defined by employers and the profession” (CEPH, 2006).

CEPH amended its accreditation criteria in 2016 to more fully reflect a CBE model. Bennett and Walston (2015) report that “as programs have adopted competencies, many have struggled and continue to struggle with actual implementation and curricular redesign.” Our Master of Public Health (MPH) program, housed in a traditional health administration department, has worked diligently to adapt to a CBE model by redesigning individual courses and associated instruction that comprise the curriculum. Our approach has been to examine each course individually and critically think about whether the course’s objectives align with the MPH program’s mission and goals, and to reconstruct course assignments to assist in attaining stated course competen-

cies. Two collaborative tools have been useful in helping us achieve this goal for one of our MPH courses, and these pedagogical approaches are adaptable to graduate and undergraduate public health courses.

GRADUATE PROFESSIONAL HEALTH EDUCATION

The University of New Hampshire (UNH) MPH program (administered by the Department of Health Management and Policy in the College of Health and Human Services) was developed in 2001 to address the shortage of formally educated public health practitioners working in public health in New Hampshire. The UNH MPH program has evolved over the last decade to expand its mission:

Through instruction, research and service, the mission of the Master of Public Health (MPH) Program at the University of New Hampshire develops public health professionals prepared to enter a collaborative public health workforce, while focusing on improving societal health and health equity (UNH MPH Program, Self-Study, 2019).

Similarly, the student body, albeit small (between 15 and 20 students), has progressed from students who possessed public health experience (95% at the start of the degree program; today, 50%) but not the educational credential to students (25%) who have recently completed a baccalaureate degree and possess little to no professional work experience. Yet, others (25%) possess significant professional experience in areas that are not health-oriented (e.g., education, finance) due to a decision to return to school to change one's career.

To accommodate this distinct student body's work schedule, the UNH MPH program is offered in the evening in a nonresidential setting at a commuter-accessible campus, with each course taken in a four-hour block of time, once a week, for eight weeks. Thus, a student may complete the UNH MPH program by taking two courses each eight-week session for two years with five elective courses taken over the academic year and/or during the summer sessions (Caron, 2019).

Due to the diversity of practical public health experience possessed by the students, the UNH MPH program utilizes pedagogical methods that factor in the learning needs and preferences of this target audience, including: (1) the ability to apply what is learned to one's professional work; (2) flexibility to tailor one's learning to professional interests and career goals; and (3) an adaptable schedule to balance the demands of school, work, and family (e.g., hybrid courses, use of distance learning, and traditional face-to-face learning environments) (Caron, 2019). To help facilitate the role critical thinking plays in analysis, inquiry, and communication, two online tools, Hypothesis and Padlet, were utilized.

The purpose of this article is to describe two tools that promote select CEPH competence attainment via collaborative online pedagogical approaches. Specifically, the assignments utilizing these tools were designed to: (1) curate and evaluate primary resources for a selected health issue; (2) develop questions based on the research and information presented; and (3) communicate discipline-specific research in a concise, professional manner to the general population. The foundational CEPH competencies these assignments addressed include: evidenced-based approaches to public health, planning and management to promote health, policy in public health, and communication (see Table 1; CEPH, 2016).

Table 1.
Select Council on Education in Public Health (CEPH) Foundational Competencies for the Population Health Management Course

<p>Evidenced-based Approaches to Public Health</p> <ul style="list-style-type: none"> • Interpret results of data analysis for public health research, policy, or practice (Hypothesis and Padlet Assignment) *
<p>Planning and Management to Promote Health</p> <ul style="list-style-type: none"> • Assess population needs, assets and capacities that affect communities' health (Hypothesis and Padlet Assignment) • Design a population-based policy, program, project, or intervention (Padlet Assignment)
<p>Policy in Public Health</p> <ul style="list-style-type: none"> • Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes (Hypothesis and Padlet Assignment)
<p>Communication</p> <ul style="list-style-type: none"> • Select communication strategies for different audiences and sectors (Hypothesis and Padlet Assignment) • Communicate audience-appropriate public health content, both in writing and through oral presentation (Padlet Assignment)

Source: Council on Education in Public Health (CEPH), Accreditation Criteria, Amended 2016, <https://ceph.org/about/org-info/criteria-procedures-documents/criteria-procedures/>

*Assignment described in the article that addresses the stated competence.

POPULATION HEALTH MANAGEMENT

Population Health Management is a synchronous online elective course in the UNH MPH program. This course typically has no more than five to ten students and meets via Zoom once per week in the evening for a four-hour block for a typical eight-week semester.

Population Health Management is a newer course in the UNH MPH curriculum. The course examines interactions among multiple determinants of health over the population's life course with the aim of developing feasible, effective, and reproducible outcomes to improve the health of populations. Emphasis is placed on the skills necessary to develop cross-sector collaborations, measure outcomes, and improve the quality of care via a critical review of the peer-reviewed literature in this area. Specific case examples of public health and healthcare system integration are analyzed throughout the semester. Table 2 identifies the specific CEPH content covered by this MPH elective course.

Table 2.

Select Council on Education in Public Health (CEPH) Content Areas for the Population Health Management Course

<ol style="list-style-type: none">1. Identify the core functions of public health and the 10 Essential Services2. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health3. Discuss the science of primary, secondary, and tertiary prevention in population health, including health promotion, screening, etc.4. Explain the critical importance of evidence in advancing public health knowledge5. Explain the social, political, and economic determinants of health and how they contribute to population health and health inequities

Source: Council on Education in Public Health (CEPH), Accreditation Criteria, Amended 2016, <https://ceph.org/about/org-info/criteria-procedures-documents/criteria-procedures/>

The course is taught in an online seminar format utilizing a mixture of teaching methods including lecture, class discussion, group work, and the incorporation of current events to illustrate central themes and course principles. Representative course assignments include:

- 1) The reading of a nonfiction book, *Fifty Thoughts on the Foundations of Population Health* by Sandro Galea, and written reflections submitted weekly that address recognized achievements and remaining challenges that call for the integration of the public health and healthcare systems. A critical analysis of these successes and the barriers that were overcome or remain were also discussed as these instances provide a foundation from which a new generation of the public

health workforce can build as they work to improve the health of populations worldwide.

- 2) A cumulative final take-home exam to assess the student's knowledge about population health in an environment that allows for contemplation of course materials, including discussions, and time to engage in the writing process.

Two additional assignments, Population Health Discussion and Population Health as a Public Good, are described in detail in the following sections.

POPULATION HEALTH DISCUSSION: HYPOTHESIS ASSIGNMENT

The primary, peer-reviewed literature is the source for evidence-based practice; thus, today's public health professional must be able to engage in critically analyzing this research to further progress the field by developing new questions to answer and by applying current research to challenging, complex population health issues. To achieve this, Hypothesis, an open source software tool that "enable(s) sentence-level note taking or critique on top of news, blogs, scientific articles, books, terms of service, ballot initiatives, legislation..." (<https://web.hypothes.is/about/>) was used.

Each student was responsible for leading the discussion of significant population health topics. The instructor selected population health articles from the *American Journal of Public Health*, *Population Health Management*, and *Health Affairs* for the assignment. Each student developed and posted at least two questions per reading (there were two peer-reviewed articles to read each week) to which the remaining students responded. The instructor reviewed the questions posed and monitored the student responses to assure a comprehensive, significant, evolving discussion was occurring. The student responses were required to incorporate references from other peer-reviewed research to help progress the discussion and, therefore, learning. The designated lead student then responded to each student and summarized the week's learning about this particular population health topic. All interactions for this assignment took place in the free version of Hypothesis. The students and instructor discussed the article via Zoom at the end of each assignment period. Topics discussed included the strength of the research, limitations, implications for policy and/or practice, and recommendations for future work. Hypothesis allowed for the students' discussion to occur online, asynchronously and collaboratively. Each discussion with questions, notes, and comments was then posted to Twitter using the course hashtag, #PHP985; hashtag, #population health, hashtag, #UNH MPH Program; and a hashtag that mentioned the article's main focus, for example, #social determinants, or #value based care, to allow for the health professions community to review and respond. Figure 1 illustrates a sample discussion using Hypothesis.

Figure 1.

Hypothesis assignment: Collaborative annotation, query, and response tool

A. Lead student develops and poses questions to peers based on the assigned article. The narrative from which the question is referring is posted above the student's question.

The screenshot shows the top portion of a Health Affairs article. The article title is "Drivers Of Health As A Shared Value: Mindset, Expectations, Sense Of Community, And Civic Engagement" by Anita Chandra, Carolyn E. Miller, Joie D. Acosta, Sarah Weiliant, Matthew Trujillo, and Alonzo Plough. The article is categorized as a "RESEARCH ARTICLE" in the "CULTURE OF HEALTH" section. The publication date is November 2016. On the right side, a comment thread is visible. The first comment, from user "fmp8" on August 23, asks: "What are some ways that we might be able to overcome barriers to sector collaboration? How can we get different disciplines to come together to create a common goal for public health?". The second comment, from user "skbartol" on August 27, responds: "One barrier to sector collaboration may be gaps in knowledge about each other's organizations (Morland & Levine, 2016). There may also be fragmented or overlapping services, depending on what the individual sectors provide (Morland & Levine, 2016). It is important for different disciplines to meet one-on-one to identify barriers to providing their intervention, as well as develop a contract, detailing each participant's responsibilities (Morland & Levine, 2016)."

B. Lead student develops and poses another question to peers based on the assigned article.

This screenshot shows the same article as above, but with a different comment from user "skbartol" on August 27. The comment asks: "Just because someone is considered 'wealthy', does that necessarily mean they are healthier? Or might this statement be based on the wealthy having easier access to care/services? What might some outside data show to support or disprove this?". Below the comment, a reference is provided: "Marmot M, Steptoe A. Whitehall II and ELSA: Integrating Epidemiological and Psychological Approaches to the Assessment of Biological Indicators. In: National Research Council (US) Committee on Advances in Collecting and Utilizing Biological Indicators and Genetic Information in Social Science Surveys; Weinstein M, Vaupel JW, Wachter KW, editors. Biosocial Surveys. Washington (DC): National Academies Press (US); 2008. 2. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK62431/>".

Figure 1.

Hypothesis assignment: Collaborative annotation, query, and response tool

C. Student's summary of article discussion (part 1 of 3):

The screenshot shows the top portion of a web browser displaying an article on the Health Affairs website. The article title is "Drivers Of Health As A Shared Value: Mindset, Expectations, Sense Of Community, And Civic Engagement" by Anita Chandra, Carolyn E. Miller, Joie D. Acosta, Sarah Weiland, Matthew Trujillo, and Alonzo Plough. The article is published in November 2016 and is available for free access. The URL is https://doi-org.unh.idm.oclc.org/10.1377/hlthaff.2016.0603. The article's abstract is visible, starting with "Making health a shared value is central to building a culture of health, a new action framework intended to spur faster progress toward equitable health outcomes in the United States. Unlike in other US social movements, such as the environmental and civil rights movements, the necessary understanding of shared values has not yet been achieved for health. Discussions". On the right side of the browser, a sidebar shows a list of student annotations. The first annotation, labeled "fmp8", is a summary of the article's discussion, mentioning a shared value framework, social mindsets, and civic engagement. It includes a question: "There were several questions that I posed to the group based on the information that I highlighted in the article. The main focus that I took in generating my questions were why do we currently do things the way we do [as a country]? How can we get different disciplines to come together for a common goal? Lastly, are there truly socioeconomic barriers when it comes to a person's health status, or does wealth just give people the ability to access healthcare if and when they require it?"

D. Student's summary of article discussion (part 2 of 3):

The screenshot shows the bottom portion of the same web browser displaying the article. The article is categorized as a "RESEARCH ARTICLE" in the "CULTURE OF HEALTH" section. The abstract continues with "Discussions". The sidebar on the right shows the second student annotation, labeled "Ar", which is a discussion of the article's content. It starts with "Discussion: Sam and Andrea came up with very well thought out answers to the questions that I posed to them. Sam mentioned two things in her response to my first question regarding how our efforts are focused on healthcare rather than health and well-being. She mentioned culture and health literacy and Andrea discussed it as being instinctual rather than a mindset. It would seem that we, as a culture, tend to want immediate and tangible results. This leads into what Sam discussed about literacy, meaning that we can make all of the unhealthy choices we want, because if something happens, we can see a doctor and they will fix it. Knowing what we do about public health, we know that a doctor is unable to fix the damage that years of smoking, or eating high fat foods, does to our bodies. The biggest struggle faced by creating and implementing a shared value system is sector collaboration. Andrea made reference to Maryland's Department of Health in her response, with the approach they are taking for sector collaboration. This approach allows multiple disciplines to come together to introduce themselves, what they do overall and the value that they can bring to a certain situation." It concludes with "Conclusion: Shared value health, creating a 'culture' of health and health equity. Creating and implementing the necessary time and resources into this approach that will be required. This approach will require that the public has an understanding of why a shared value system is beneficial, but that it will also come with its own set of challenges. As the article mentions, it will require a cultural shift. Shared value health also will require more work on the healthcare provider end, meaning they will need to have more time to spend with their patients to address and 'whole person' approach to health, rather than treating acute symptoms. This will also require more resources needing to be available in healthcare settings, hence the importance of collaboration." Citations are listed as "Chandra, A., Miller, C. E., Acosta, J. D., Weiland, S., Trujillo, M., & Plough, A. (2016). Drivers of Health As A Shared Value."

Figure 1.

Hypothesis assignment: Collaborative annotation, query, and response tool

E. Student's summary of article discussion (part 3 of 3):

The screenshot shows a web browser displaying a research article from Health Affairs. The article title is "Drivers Of Health As A Shared Value: Mindset, Expectations, Sense Of Community, And Civic Engagement" by Anita Chandra, Carolyn E. Miller, Joie D. Acosta, Sarah Weiland, Matthew Trujillo, and Alonzo Plough. The article is published in November 2016 and is available for free access. A Padlet annotation tool is overlaid on the right side of the page, showing a list of citations related to the article's topic, including works by Chandra et al. (2016), Montero et al. (2015), and Morland & Levine (2016). The Padlet interface includes search, share, and download icons at the top, and a list of items with their titles and publication details.

POPULATION HEALTH AS A PUBLIC GOOD: PADLET ASSIGNMENT

Communicating information about the essential service of public health and the role for the healthcare system is an important way to educate the public about health promotion and disease prevention efforts. The act of communicating effectively is a science and an art that stands at the center of the work of health professionals. Each group identified a population health issue about which to inform the public. Padlet, an online collaborative tool, allows for a great deal of information to be displayed and shared via a template (<https://padlet.com/features>). Padlet was used to allow students to collaborate and collect peer-reviewed research on their identified population health issue. The students then posted their Padlet to Twitter to communicate important population health issues with the public. Representative hashtags for this assignment included: course hashtag, #PHP985; hashtag, #population health, hashtag, #UNH MPH Program; and a hashtag that mentioned the Padlet's main focus, for example, #lead poisoning, or #antibiotic resistance, to allow for the health professions community to review and respond.

Each student group's Padlet consisted of the following researched and cited information:

- Background of the population health issue (e.g., population needs, assets and capacities, etc.)

- Quantitative and qualitative data collection methods that have been used or are appropriate to study this population health issue
- Current state of research on this public health issue used to inform policy or practice
- The organization, structure, and function of healthcare, public health, and/or regulatory systems across national and/or international settings responsible for working on this population health issue
- Proposed strategies to identify stakeholders and build coalitions and partnerships for influencing population health outcomes
- Design of a population-based policy, program, project, or intervention
- Communication of audience-appropriate public health content

All interactions for this assignment took place in the free version of Padlet. The students presented their Padlet via Zoom at the end of the assignment period. Figure 2 illustrates a representative Padlet.

CONCLUSION

The Association of Schools and Programs of Public Health developed a task force titled “Framing the Future,” which conducted a broad review of public health education in the United States. The Framing the Future Task Force, composed of educators from CEPH-accredited schools and programs and public health practitioners, provided guidance “for an overall reframing of the MPH degree” (ASPPH, 2019). Their work resulted in the revised accreditation criteria put forth by the CEPH in 2016 that altered the emphasis from core curricula, or knowledge, public health graduates should have to core competencies, or skills, these graduates should possess at the completion of their programs (Krisberg, 2017).

The revised accreditation criteria will require all MPH students to attain 22 competencies across eight domains: evidence-based approaches to public health, public health and health care systems, planning and management to promote health, policy in public health, leadership, communication, interprofessional practice and systems thinking. Within those domains are competencies such as analyzing quantitative and qualitative data using biostatistics, informatics, computer-based programming and software; explaining basic principles and tools of budget and resource management; evaluating policies for their impact on public health and health equity; and selecting communication strategies for different audiences and sectors. Under the revised criteria, every MPH student must be assessed on each of the 22 competencies at least once (Krisberg, 2017).

Although elective courses are exempt from having to map competencies to their program’s mission, the exercise of developing competencies to the MPH elective course described in this article is presented to demonstrate how two

Figure 2.
Padlet assignment: Collaborative, research-based, communication tool

Two different Padlets for the same population health issue are shown. Representative sections of the Padlet are demonstrated due to space limitations.

Lead Poisoning Awareness

- Lead: What is it, and how does it impact us?**
 - Who is at Risk?** Children are at increased risk for lead poisoning, because of the crucial developmental changes that they are experiencing. Lead is absorbed faster by children, resulting in slowed brain development and cognitive impairments. Children are also more likely to have hand-to-mouth behaviors, which puts them at higher risk for ingesting lead in paint chips, toys, etc. Pregnant women are also at higher risk for lead poisoning, because of the developmental phases that their bodies and their babies undergo during pregnancy. Just as lead impacts child development, it
- Qualitative & Quantitative Data Collection**
 - LeadCare II Analyzer Machine** This video shows the machine that is most commonly used in healthcare offices to test lead levels in pediatric patients. The video shows the process of calibrating the machine, collecting the sample and running the test for results. Retrieved from <https://youtu.be/3g478-62YM8>
- Current State of Research**
 - Age & Poverty** Younger children are more likely to face negative effects of lead poisoning, because they are experiencing crucial developmental changes, which are negatively affected by lead exposure. Children who are living in poverty are also more likely to be lead poisoned, because they are more likely to be living in older homes. This map indicates counties that are at higher risk for childhood lead poisoning, based on the prevalence of children, aged 0-4, who are living in poverty in NH (NH Wisdom).
- Regulatory Systems, Stakeholders & Partnerships**
 - National Organizations & Regulatory Systems for Lead Poisoning** Organizational & Regulatory Systems for Lead Poisoning
 - Identifying Stakeholders & Partnerships**
- Program to Increase Lead Poisoning Awareness**
 - PSA** Community awareness to lead poisoning can also be increased through educational videos, much like the example attached below from Harris County, Texas.
 - Childhood Lead Poisoning Prevention by Harris County Public Health** youtube
 - National Lead Poisoning Prevention Week**
- Citations**
 - Qualitative and Quantitative Data Citations**
 - Current State of Research & Program to Increase Lead Poisoning Awareness Citations**

Lead Paint Awareness
Public Health as a Public Good and a Public Service

- The Wonders of Lead Paint**
 - Lead White Pigment(5)**
 - Why Lead based Paint?** White lead, lead(II) carbonate (PbCO₃), and other lead based paint was widely used on wood based surfaces like toys or home walls for its water-resistance and durability? Only a small amount of a lead compound is needed to spread across a large area, as it is very opaque making it more cost
- More on Lead**
 - What are 'Safe' Lead Levels?** 'Normal' blood lead levels:
 - Adults: 10 (µg/dL)
 - Children: 5 (µg/dL)
 - Lead Isn't Just in Paint! (4)** **COMMON SOURCES OF LEAD EXPOSURE**
 - What is Lead poisoning?** According to CDC, Lead poisoning is when a person's health or body functions are negatively affected by lead contamination in what they eat, drink, touch, or breathe! **Lead hazards:**
 - Lead-based paint for homes and other buildings built
- Epidemiological Data**
 - Average blood lead levels in children 1 to 5 1970-1990** **Link** Since 1978, blood levels have been aggressively tackled, from 15 (µg/dL) to 2.7 (µg/dL) after 1990.²
 - Average blood lead levels in children 1 to 5 and federal policies From 1990-Present** **Link** The drastic decline seen above has been slow moving shown in 1970-2010. **Link**
- Current State of Research**
 - Current Status of Childhood Lead Poisoning** Lead poisoning affects children of all races and socioeconomic levels, the disease is concentrated primarily in economically distressed communities¹. Families who rent are more likely than homeowners to live in a high-risk housing unit. An estimated 27% percent of housing units in the U.S. have significant lead-based paint hazards. The vast majority of these were constructed before 1978, when the use of lead in residential paints was banned¹. Lead-contaminated household dust is the most common source of exposure. Lead dust is generated by deteriorating lead-based paint or created by friction or impact of lead-painted
- Prevention For Lead-Free Tomorrow**
 - TEST! RED=LEAD (4)**
 - Home Owner, Renter or Buyer - Start Asking! EPA**
 - Buying a home?** If the home was made before 1978, have a paint inspection or risk assessment performed.¹
 - Renting?** Make sure to ask about lead testing - be sure to acquire disclosure forms at time of signing your rental agreement - in compliance of state laws.
- Alternative Communication Strategies**
 - Childhood Lead Poisoning Prevention Program Components in NH** **Education:** works toward building community capacity for critical partners to increase awareness. Provides resources and support, while also develops and implements public education campaigns targeted to prevent lead-based paint exposure and to increase the availability of lead-safe housing in the state (1). **Case Management:** helps to ensure that any child with an elevated blood lead screening or confirmatory test result receives appropriate, comprehensive, and coordinated medical and environmental follow-up, resulting in a decreased blood lead level (1).

specific collaborative online tools may be used to attain select competencies for a graduate program (CEPH, 2019b).

The purpose of the work described here is to present two online collaborative tools that can be used to teach graduate public health students how to critically assess practical research in this area and creatively communicate their research on evidence-based practice. First, to analyze research that informs practice and to further progress the field by developing new questions to answer, Hypothesis is described. Second, the act of communicating effectively is a science and an art that stands at the center of our work as health professionals; thus, Padlet is described. Further, the online tools described in this article possess utility in other health-oriented and non-health-oriented graduate courses with competency requirements.

Two key objectives of this course are: (1) distilling a great deal of information pertaining to evidence-based practice via the peer-reviewed literature; and (2) communicating public health messaging in a coherent manner that is constructed from evidence-based research and practice, thus emphasizing the connection between evidence-based research and evidence-based practice. The students used the online, collaborative tools (which they were unfamiliar with prior to this course) to curate, analyze, and query information; prepare comprehensive, referenced questions; and present, concisely and effectively, their researched public health messages—thus contributing to our MPH program's instructional goal of preparing "public health professionals to enter multidisciplinary sectors with the knowledge, skills, and values to improve the population's health" (UNH MPH Program, Self-Study, 2019).

Transferring research-based knowledge into practice is an essential skill for public health professionals. As today's health professions students come to our educational programs from diverse professional backgrounds with varying levels of expertise, understanding how research and practice inform each other and how this relationship affects their daily work is an essential element that can be transported from one health position to the next over the course of a career (Caron, 2019). It is imperative that faculty develop assignments that engage students in becoming competent in the requisite skills. Table 3 illustrates a crosswalk for the Hypothesis and Padlet tools, assignments, their related CEPH competencies, and how these online collaborative tools help develop required skills for the health professional.

Because the majority of students in the class had no experience with either Hypothesis or Padlet, at the conclusion of each assignment, they were asked to reflect on their experience. A few select student comments follow:

- "Hypothesis is a tool that helped me to efficiently annotate research articles. It is an effective tool that I have also started to use in my pro-

Table 3. Crosswalk of Hypothesis and Padlet Tools, Assignments, CEPH Competencies, and Health Professional Skills

Online Tool	Assignment	CEPH Competencies	Health Professional Skills
<i>Hypothesis</i>	<ul style="list-style-type: none"> Evaluate the peer-reviewed literature Student developed questions and responses Examine the strength of the research, limitations, implications for policy and/or practice, and recommendations for future work. Hypothesis allowed for student discussion to occur online, asynchronously and collaboratively. 	<p>Evidenced-based Approaches to Public Health</p> <ul style="list-style-type: none"> Interpret results of data analysis for public health research, policy, or practice <p>Planning and Management to Promote Health</p> <ul style="list-style-type: none"> Assess population needs, assets, and capacities that affect communities' health <p>Policy in Public Health</p> <ul style="list-style-type: none"> Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes Select communication strategies for different audiences and sectors 	<ul style="list-style-type: none"> Evaluate, Analyze, Critique, Question, Conjecture, Develop, Relate, Interpret, Discuss, Explain, Defend, Communicate
<i>Padlet</i>	<ul style="list-style-type: none"> Researched and cited information on a population health issue: Background of the population health issue (e.g., population needs, assets and capacities, etc.) Quantitative and qualitative data collection methods that have been used or are appropriate to study this population health issue Current state of research on this public health issue used to inform policy or practice The organization, structure, and function of healthcare, public health, and/or regulatory systems across national and/or international settings responsible for working on this population health issue Proposed strategies to identify stakeholders and build coalitions and partnerships for influencing population health outcomes Design of a population-based policy, program, project or intervention Communication of audience-appropriate public health content 	<p>Evidenced-based Approaches to Public Health</p> <ul style="list-style-type: none"> Interpret results of data analysis for public health research, policy, or practice <p>Planning and Management to Promote Health</p> <ul style="list-style-type: none"> Assess population needs, assets, and capacities that affect communities' health Design a population-based policy, program, project, or intervention <p>Policy in Public Health</p> <ul style="list-style-type: none"> Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes Select communication strategies for different audiences and sectors Communicate audience-appropriate public health content, both in writing and through oral presentation 	<ul style="list-style-type: none"> Evaluate, Analyze, Critique, Query, Conjecture, Develop, Relate, Interpret, Discuss, Explain, Design, Communicate

fessional work not only for research articles but also health websites and education materials.”

- “I enjoyed learning new tools that will not only help me in other courses in my degree program but also in my everyday work.”
- “Both of these tools were useful to not only learn for the benefit of the assignment, but I also really appreciated how we used them to communicate the work we were doing in this course to a broader audience from a diverse educational background.”
- “I was nervous about learning new computer-based tools as I have been out of the classroom for a while. However, these tools were easy to learn to the point that I am using them in my other courses.”

The faculty instructor’s summation following the experience of using two online, collaborative tools in one course that is qualitative in nature, is that it allowed for: (1) a sustainable engagement with the course material in a community of learners who possessed varied educational backgrounds and professional experience, (2) an increase in interaction among peers and communication with the instructor while delving into the current research that informs practice in this field, and (3) an exposure of students to online tools that they can use when they are practicing in the field. Employers and graduate program accreditors expect our graduates to be proficient in the skills utilized in the field. To achieve this foundational approach for students who come to our programs with varied public health experience, the utility of Hypothesis and Padlet can help teach the skills required of the next generation of public health practitioners.

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