Supporting Collaborative Practice to Encourage Consistency and Accuracy in the Classroom: An Interdepartmental Curricular Alignment

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Abstract

In a concept-based nursing program curriculum, pharmacology is often interwoven into many concepts and exemplars that are taught across all courses by various faculty and departments. This creates differences in how the material is presented and variability in what is provided to students. Another related challenge is the siloed approach to higher education, where different departments maintain strict control over their curriculum even when the content and the students are shared across departments. This article reviews a collaborative process for curricular review that was conducted to support nursing students' pharmacology experience. To address nursing students' mastery of pharmacology at a two-year associate degree nursing program, a collaboration between the Nursing Department and Biology Department faculty was established to assess nursing faculty comfort level with Pharmacology, to increase Biology Department pharmacology instructors' understanding of the NCLEX, and to share best practices in teaching pharmacology with Nursing faculty. This article reviews the steps of the collaboration, including best practices and pitfalls, and shares insights that support the development of similar collaborations at other institutions to support student learning when there are multiple academic units involved in their program of study.

Keywords: interdisciplinary collaboration, pharmacology instruction, nursing instruction

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The Problem

At our college, pharmacology was an identified area of weakness for 2-year associate degree nursing students through both program assessments and National Council Licensure Exam for Registered Nurses (NCLEX-RN) performance. The current curriculum has pharmacology being taught as a stand-alone course by Biology Department faculty to pre-nursing or first year nursing students. There is mounting evidence that new graduates lack the appropriate foundational knowledge to administer medications safely (Dilles et al., 2011). Similarly, Wiernik (2015), in the American College of Clinical Pharmacology (ACCP), expressed that there was "an urgent need to improve and expand clinical pharmacology education in undergraduate physician and nursing training." The ACCP recommended that a conference, involving a collaboration between multiple disciplines (clinical pharmacology, medical and nursing education, and other stakeholders), should be held to brainstorm and implement tangible steps to make the needed changes (Wiernik, 2015).

The authors explored the possibility of whether our current way of teaching introductory pharmacology as a stand-alone course was more beneficial for students than having the course content distributed within nursing courses. Studies are inconclusive whether a pharmacology course that is fully integrated into the nursing curriculum is more beneficial than a stand-alone introductory pharmacology course. Zellner (2013) notes, "Findings demonstrated that teaching a separate pharmacology course did not result in an increase in scores. Faculty are, therefore, encouraged to plan defined content enhancement throughout the curriculum when pharmacology is taught as a separate course," (p. 347). The evidence did not support changing our current design; therefore, our focus became how to improve the student acquisition of pharmacology

knowledge in the existing model. These findings gave rise to conversations related to the need for increased collaboration between the two departments involved, nursing and biology. Increased collaboration would enable the departments to evaluate and address opportunities for improvement to the pharmacology curriculum, thus addressing this area of weakness. The project became not merely curricular revision, but also how to support effective collaboration between two separate college departments when large collaborative projects were not the norm. This challenge is not unique to these departments; rather, the concept of siloed environments is common in higher education as "disciplinary approaches often tend to focus only on a set of trees within a great forest" (Jacob, 2015).

Background

A strong foundation in pharmacology is needed to succeed in a nursing program, to pass the state licensure exam (NCLEX-RN), to meet professional standards, and to promote patient safety. As previously noted, studies indicate that pharmacology is identified as an area of weakness by students in nursing programs. In a 2011 study by Dilles et al., qualitative and quantitative data indicated pharmacology as an area of weakness. The 29 participating schools utilized a variety of formats for incorporating pharmacology into their programs. All participating students completed a medication knowledge and calculation test. The mean scores on the pharmacology section and calculation section were found to be low at 55% and 66% respectively for bachelor's degree students, and 52% and 53% for diploma students. Students in the study also reported that they perceived themselves unable to deliver safe medication care in practice. On a scale of 1–10, 27% had a self-rated readiness perception ≤ 5. Poor pharmacology knowledge can affect the student's ability to progress in the program. It can also lead to unsafe

patient care in the clinical setting. This study confirms that educators need to focus on more effective ways to incorporate pharmacology into nursing programs.

In addition to causing difficulty while in a nursing program, failure to grasp pharmacology content impacts student success on state licensure. The 2019 NCLEX-RN Test Plan devotes 12-18% of assessment questions to pharmacology and parenteral therapies. Success on the test is required to obtain licensure, and failure results in loss of income and self-esteem for the student, loss of applicants for health care organizations, and potential loss of the educational program's reputation and accreditation status. The clear evidence of the link between low performance in pharmacology courses and increased failure on the NCLEX-RN (Emory, 2013) resulted in the topic being selected by the Nursing Department as an essential focus area to address their low NCLEX-RN scores.

The need for competency in pharmacology goes beyond the classroom. Once in practice, errors related to medication knowledge and administration become a public safety issue. Sources of error can include issues related to improper dispensing, calculation, monitoring, or administration (Mayo & Duncan, 2004). The National Coordinating Council for Medication Reporting and Prevention (NCCMERP) defines medication error as "any preventable event that may cause or lead to inappropriate medication use or patient harm" (2012). Ten to 18% of all reported hospital injuries have been attributed to medication errors (Fontan et al, 2003), and five percent of all medication errors reported to the Food and Drug Administration in 2001 were fatal (Thomas, Holquist, & Phillips, 2001). These numbers, while alarming, might not indicate the full extent of the problem, as research suggests that six out of every seven hospital-based errors, accidents, and other adverse events go unreported (Shaw, 2012). In addition to harming patients, medication errors also increase health care costs and negatively impact the nurse's professional

reputation, confidence, and practice (Mayo & Duncan, 2004). The World Health Organization suggests that medication errors cost the US between six billion and 29 billion per year (2014). In addition, errors related to medications are not limited to new graduates. A 2014 study by Simonsen on the differences between new graduates and experienced nurses showed that medication knowledge among experienced nurses was superior to bachelor students in nursing, but still insufficient. As many as 25% of the answers to the drug management questions answered by experienced nurses in the study would have led to a high risk of errors. These findings support the need for a more effective incorporation of the pharmacology curriculum in nursing education. A 2021 study by Myroniak and Elder suggests that this issue with pharmacology is not improving. Their literature review included sources that indicate that "only 41% of new nurses were proficient in medication administration and only 28% had knowledge of pharmacologic implications" (as cited in Zimmerman & House, 2016, p. 49). Additional findings from the study indicate that novice Registered Nurses (RNs) admit the need to improve medication knowledge and application (Lim & Honey, 2017).

Finding a Solution

To support increased student learning, a review of the pharmacology content in the curriculum was conducted during Fall 2018 by the authors, each representing and coordinating with their respective departments. This review assessed at what point in the curriculum pharmacology is introduced, reinforced, and assessed in the Nursing Program. Pharmacology is introduced in a Biology Department course titled, "Introduction to Pharmacology," while nursing faculty teach application and reinforcement of content throughout the Nursing Program. This

curriculum review uncovered a need for collaborative discussion between biology and nursing faculty related to teaching focus, best practices, and specific needs of nursing students.

The review revealed that while the content was introduced in pharmacology and reinforced in nursing, the differing faculty perspectives resulted in a lack of alignment between departments in their approach to teaching the content. The Nursing faculty were aware of the course outcomes and drugs covered in the pharmacology course but did not have a full appreciation of how the delivery of the material differed from nursing's approach. Nursing has a focus on the application and clinical use related to medications and expects students to apply their pharmacology knowledge to the clinical setting. Students were arriving into nursing with a theoretical approach to the medications rather than one that came from an application perspective, one in which they envisioned themselves as responsible for administering medications to live patients, and all that goes into that important task. The authors felt that only a collaborative effort could bridge this gap between theory and application to support student success and ultimately patient safety. Pharmacology faculty felt confident in general pharmacology content and the pharmacokinetics and pharmacodynamics of the various drug classes covered by the course but expressed a need for better understanding of the clinical mindset that the Nursing Department was hoping to add to the introductory pharmacology course. Through conversation at the individual department level, it was clear that both groups were in favor of working together to address this issue.

While the faculty were supportive of working together, this collaborative approach meant working in uncharted territory that could potentially come with challenges. Interdisciplinary collaborations can be difficult as there are often tensions that exist when combining experts from multiple fields (Jacob, 2015). Collaborations are considered a way to address problems facing

higher education, but they frequently fail (Eddy, 2010). Jacob (2015) identifies 10 key characteristics to support successful interdisciplinary work, namely leadership and management, effective communication, personal reward, appropriate resources, appropriate skills mix, positive climate, individual characteristics, clarity of a shared vision, quality and outcomes, and respecting roles (p. 2). While these elements can be challenging to put into place if not already preexisting, collaboration in the workplace can result in better utilization of resources and creative outcomes that would not occur if done individually. Without attention to these factors, the result could be ineffective collaboration due to personality differences, misalignment of goal or vision, or lack of motivation. The authors' initial assessment determined that of Jacob's identified characteristics, several supportive pieces were already in place. To prevent complications, the authors created a purposeful plan to bring the two departments together for a common goal, the support of the students and, ultimately, better patient care. This focus on collaboration allowed the possibility of a broader impact from our project, contributing to best practices for collaboration in higher education. This development of a reproducible method for encouraging collaboration addresses the "lack of research on how to reorganize higher education institutions for collaborative work," noted by Kezar (2005).

The Collaborative Process

As we began our project, we used the definition of collaboration described by Mattessich and Monsey (1992) as a guide for fostering the relationship between the two departments. The authors viewed collaboration as a "mutually beneficial and well-defined relationship entered into by two or more organizations to achieve common goals" (Mattessich & Monsey, 1992, p. 12). The first step was to demonstrate that the project was mutually beneficial to both departments.

To achieve this, the students, while classified as Nursing students, were referred to as 'our students' by the biologists to increase the sense of joint responsibility and meet Jacob's shared vision key characteristic. By focusing on the data around the student struggles with pharmacology on the NCLEX, we used quantitative data to identify a common problem for our students. Both Nursing and Biology faculty care deeply about supporting student success, and this became our mutual goal. This joint recognition of our shared goal was important so that we could minimize any perception of competition.

Acknowledgement of individual areas of expertise was another important step to ensure that we met the well-defined relationship aspect of our working definition of collaboration. Biology faculty had the expertise related to the stand-alone course curriculum and were content experts. The Nursing faculty were experts in the nursing considerations of pharmacology, clinical mindset, as well as NCLEX needs. This provided a positive and empowering climate and ensured we were respecting each other's areas of competency as Jacob (2015) recommends. Once buy-in, roles, and goals were established, we developed action steps and embarked on a collaboration that has already resulted in positive outcomes.

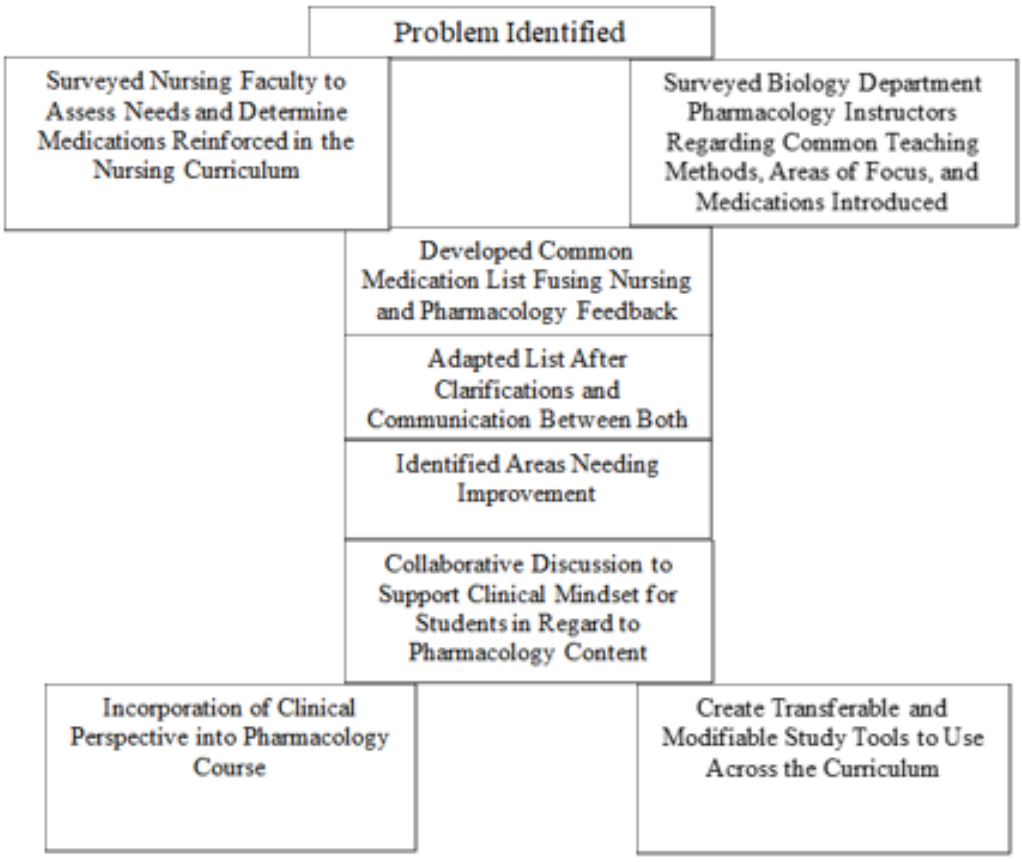
The first step (Figure 1) involved the development of department-specific surveys which were sent to all faculty requesting feedback on specific prompts related to concerns about the pharmacology content across both curricula. Both groups were asked to list and describe problems they perceived related to course content or approach from the faculty perspective. In addition, the surveys included questions about concerns related to student comprehension and application of the material. Both sets of faculty shared the medications they currently taught as well as which ones they considered a priority. The authors reviewed the feedback, conducted a

literature review of best practices related to pharmacology in Nursing education, and identified some key components of effective collaboration.

The survey findings were shared with both groups for discussion and clarification. These discussions allowed us to develop a mutually agreed upon priorities, which included developing a common medication list, supporting the development of clinical mindset for pharmacology students, and developing an ongoing plan of review to support continued assessment of this area.

Figure 1

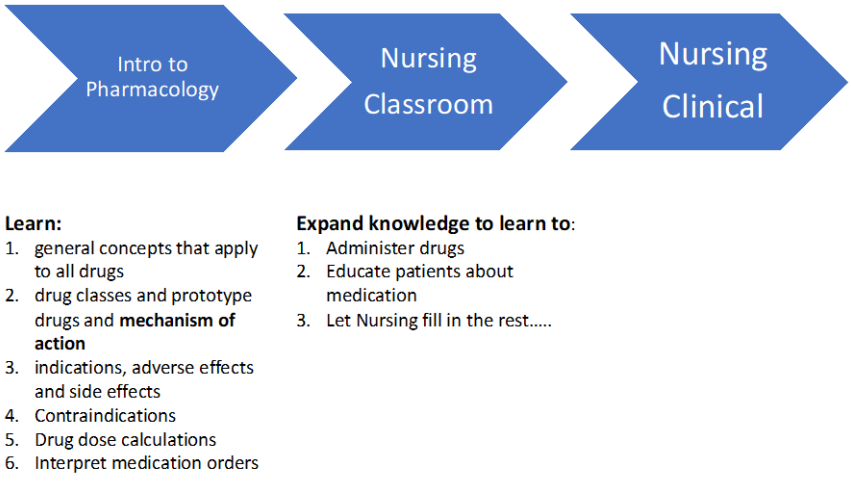
Collaboration Process Action Steps



The common medication list was created by merging the nursing and pharmacology feedback. The goal was to develop a list that was based on medications commonly used in practice, which included the important safety features that were critical for nursing students and nurses to know, and which were considered commonly tested items on the NCLEX. The authors started with the usual drug class and representative drug list that had been used for the past several years and made additions and deletions to the list based on Nursing faculty and Biology faculty input. This resulting list ensured that all students in pharmacology had exposure to a core group of medications that would be specifically reinforced in the Nursing Program. Figure 2 shows the agreed upon flow of content introduction and reinforcement. This graphic provided faculty from both departments, as well as students, a clear depiction of the process which we are intentionally undertaking to create the bridge between pharmacology theory and nursing practice.

Figure 2

Revised Common Curriculum



Survey feedback from Nursing faculty also indicated that there was a need to help students in the introductory pharmacology course develop a clinical mindset regarding pharmacology content. The authors define clinical mindset as thinking like a nurse by utilizing and incorporating critical thinking and theoretical foundations into their role as future health care providers. Thinking like a nurse implies an application approach to pharmacology that considers patient safety, moral and ethical responsibilities, and the practical aspects related to administering medications. This working definition is supported by research which affirms that critical thinking and thinking like a nurse has "become a benchmark of professional competence and student performance" (Di Vito-Thomas, 2005). Biology and nursing faculty discussed tangible steps, options and strategies to support this clinical mindset in pre-nursing and nursing students. Biology faculty reported feeling nervous about teaching nursing considerations and implications since they did not have training as nurses. To address this issue, Nursing faculty provided clarification on exactly what a clinical mindset entailed and the need for the addition of specific strategies to support the students in developing and reinforcing it in the pharmacology classroom setting. This approach encouraged students to hold a vision of themselves as practicing nurses who daily administer these medications to their own live patients. Pharmacology instructors agreed on the importance of supporting this transfer of knowledge.

Implementing the Plan

Implementation of the plan began in July 2018 with the creation of the common medication list, materials to support a clinical mindset within the students, and the development and roll out of an ongoing plan of review to support assessment.

In order to achieve this goal of encouraging a clinical mindset and the transfer of knowledge, Nursing faculty created a template PowerPoint slide series to be used by all Biology faculty teaching "Introduction to Pharmacology" to explain to students how the introductory pharmacology course creates a foundation upon which the Nursing courses and clinicals build and expand (See Figure 2). In addition, members of both departments encouraged the development of transferable and modifiable study tools for use across the pharmacology and Nursing curricula. The Biology faculty wanted tangible tools that could be used in their course that involved clinical application, and the Nursing faculty wanted tools that the students could bring with them into the Nursing Program.

In a joint meeting in late Spring 2019, Nursing and Biology faculty worked on developing such tools and agreed that pharmacology instructors would emphasize the fact that an individual student's pharmacology study system (cards, outlines, etc.) would be something that Nursing faculty expected them to bring into their nursing classrooms as a learning tool upon which to expand. In consultation with each other, Nursing and Biology faculty agreed on criteria for what sorts of information was necessary for students to know for each drug class, such as mechanism of action, therapeutic indications, contraindications, drug interactions, and adverse effects. Nursing instructors would later have students include additional specific information like dosages and nursing considerations to their card or outline study system once in the program. This clear division of roles addressed the Biology faculty's concerns of having to teaching nursing content and the Nursing faculty's concerns about students acquiring the knowledge required for clinical competence.

The final step was to develop a timeline that ensured ongoing evaluation of the pharmacology course content and students' transfer of that knowledge to their Nursing courses.

It was agreed upon that an annual joint meeting would be held to review medication lists, student success in pharmacology, NCLEX success rates, and updates on best practices to inform future improvements.

The time from inception in July 2018 to the joint meeting in May 2019 when outcomes where shared was approximately nine months. At that time, tangible products and changes were implemented. In September 2020, the first annual review occurred to discuss the impact seen from the changes, to discover future opportunities for improvement, and to update the medication lists.

Outcomes

The first tangible outcome was the documentation of our course review process based on best practices for collaboration. While there were some examples of the typical pitfalls of collaboration, the final process was found to be effective as it encouraged teamwork, with both departments working towards achieving mutually beneficially goals. Pitfalls to progress included scheduling difficulties, obtaining timely feedback, defining pedagogical roles of each department's faculty, and ensuring that both sides felt heard and respected for their unique roles. For scheduling, getting two large departments together for what the authors felt were important face-to-face meetings was challenging due to differing class scheduling and availability. This obstacle was addressed by setting meeting times when the majority of faculty could attend and by soliciting electronic feedback from those that could not. Due to varying schedules and workloads, as well as differing levels of interest, obtaining timely responses from all faculty was another obstacle. The authors determined the key people from whom they needed feedback due to their role in the courses and ensured that those faculty members provided their perspective to add to the completeness of the review. For this reason, a 100 percent response rate was not

expected. The authors paid particular attention to the emotional aspects of this collaboration, taking great care to acknowledge and nurture a healthy inner climate within each faculty group.

The benefits of the collaboration more than outweighed the pitfalls. These benefits included closer alignment of learning objectives and teaching focus, renewed relationships between colleagues, and better understanding of the student experience. In addition to developing a successful collaboration process, other outcomes included the development of learning strategies that could be used in both Biology and Nursing courses to support student learning. Pharmacology is brimming with complex concepts and terminology. Nursing students typically struggle with applying the decontextualized pharmacology information in the Biology course to practical clinical situations. Specific strategies woven into the course pedagogy of Nursing students that involved meta-learning have been shown to help students learn challenging content, increasing confidence and ease in their learning, helping them to see the potential benefit of performing these activities, and scoring higher on exit exams (Alton, 2016). This joint project not only led to developing learning activities that helped students to make clinical connections to their technical pharmacology content, but also could increase their retention of the material to better support transfer to Nursing courses. The drug class study system activity and the short clinical case scenarios are two examples of learning strategies. Drug Class study systems, as shown in Figure 3, take a variety of paper or electronic forms including drug flashcards, drug outlines, summary sheets, and graphic organizers. We established criteria for the required content for each drug or drug class. All instructors for the Introduction to Pharmacology course committed to require students to create their own personal study system for organizing and reviewing drugs and drug classes, and also to including clinical applications

with most of the drug classes. We will be looking at future graduates NCLEX-RN pharmacology sections test scores to determine the effectiveness of these strategies.

Figure 3

Example of Drug Class Study System

In addition to this study system, Figure 4 shows the list of 10 basic clinical topics that was created as a shared list of topics in which to develop Nursing/Pharmacology Clinical applications. Using these topics for short clinical scenarios involving medications and simple nursing considerations allows students in pharmacology courses to start making the connection between drug effects and nursing considerations without requiring Biology faculty to have in-depth knowledge of the nursing role.

Figure 4

Shared List of Basic Clinical Topics

The Greatest Hits of Nursing/Pharm Clinical applications from 5-1-19 meeting

1. Opioids and constipation
2. Nitroglycerin and Headache
3. K+ , Dig, and Lasix
4. Anticoagulants and Bleeding
5. BP meds and orthostatic hypotension
6. Antibiotics and ototoxic and nephrotoxic effects
7. Lithium toxicity
8. Penicillin and anaphylactic shock
9. Antipsychotics and EPS
10. Steroids and insulin

Conclusion

The project has already been through its first annual review at which time improved NCLEX-RN pass rates were shared, upcoming updates to the NCLEX-RN testing format were provided to both groups, and the medication list was reviewed and reaffirmed. Preliminary findings of improved pass rates on the Pharmacology section of the NCLEX-RN, increased communication between the two departments, as well as the effective incorporation of teaching tools and strategies within individual instructors' courses suggest that the collaboration was a success. The overall benefits include increased support of student acquisition and application of Pharmacology knowledge as well as the development of positive faculty relationships that support ongoing and future collaboration. A review of results from 2020 graduates shows an increase in scores on the Pharmacology sections of the NCLEX-RN. This increase will positively

impact student overall success on the NCLEX-RN as well as their ability to provide safe care at the bedside. In addition, faculty from both departments report positive outcomes including a better understanding of their role in teaching the content, clearer view of the NCLEX-RN and what it tests, positive relationship building, a desire to continue these efforts between the two departments, and a willingness to explore other collaborative opportunities with other departments.

Recommendations

In order to foster collaborative projects between departments, there are several new challenges that require attention and action. The first is the need to have key organizers from each department initiate and maintain consistent communication. To address this, for example, both departments will need to add the annual review of the Pharmacology course to the job description of their key person, the "Pharmacology" representative. The ongoing efforts become functions of the role, and not the responsibility of an individual person. This will ensure that the work continues no matter who is in the position. The authors also recommend that future leaders from both departments be identified well before the eventual role shifts occur and be included in the annual review meeting to ensure seamless transitions.

Looking to the future, the authors see a great opportunity to expand this interdepartmental collaborative initiative. The Nursing Department can work more intentionally with the service courses that support their students, and the Biology Department with the programs that they serve. In addition, this type of curricular cooperation should not be limited to our own departments or institutions but could serve as a blueprint for any academic setting where departments or units serve common students, and curricular coordination would support positive changes. Often, we see our curriculum as being owned and managed in silos. This new approach

is one in which the student's experience and progression of learning are the focus of curricular development. Through the influence of multiple departments and experts working together for their common good, students could become increasingly more skillful and well-rounded professionals.

Interdepartmental collaboration becomes the bridge to making this all possible, and the authors envision it as the wave of the future for more effective teaching and learning. This type of bridging is a powerful model for students to see in action as it lays the groundwork for greater understanding and appreciation for working with others to solve problems. It highlights the necessity of blending multiple perspectives to create something greater than could have been done individually. As we prepare students for their post-academic lives, it is our hope that this practice will transfer to both personal and professional situations where a higher good can be achieved by diverse groups working together.

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