

# THE EVOLUTION OF A DOCTOR OF NURSING PRACTICE CAPSTONE PROCESS: PROGRAMMATIC REVISIONS TO IMPROVE THE QUALITY OF STUDENT PROJECTS

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The past several years have seen explosive growth in the number of doctor of nursing practice (DNP) degree programs offered by colleges of nursing in the United States. Through a process of trial and error since 2005, the faculty at the University of Colorado, College of Nursing, have revised the course structure and procedures related to the DNP capstone project to improve the quality and usefulness of these student projects. Efforts have focused on educating and involving all nursing faculty in the DNP capstone process, distinguishing between competencies for our PhD and DNP projects, clearly aligning the DNP capstone project with quality improvement methods rather than with research, working with our campus institutional review board to clarify regulatory review requirements for quality improvement studies, developing a review committee to oversee DNP students' projects, and structuring our sequential course requirements to encourage students' professional presentations and publications. Our current capstone process reflects 7 years of iterative work, which we summarize in this article in hopes that it will help institutions currently in the process of developing a DNP program. (Index words: DNP; Capstone; Doctoral education in nursing; Quality improvement projects) *J Prof Nurs* 29:370–380, 2013. © 2013 Elsevier Inc. All rights reserved.

THE DOCTOR OF nursing practice (DNP) was conceived and designed by the American Association of Colleges of Nursing (AACN) in 2004. The action was in response to the Institute of Medicine's (IOM) reports (IOM, 1999, 2001) that supported a societal need for change in nursing education due to the increased complexity of our health care environment and the need to improve the quality of health care in the United States. The AACN recommended that by the year 2015, the DNP should replace the master's degree as the standard educational preparation for advanced practice nurses. More than 300 U.S. colleges and universities have either developed DNP

programs or are embarking on a plan to commence such programs (AACN, 2011), representing more than two thirds of U.S. nursing schools and colleges (Patzek, 2010). This is more than twice the number of institutions—124—that currently offer a PhD in nursing (AACN, 2011).

In its “Essentials of doctoral education for advanced nursing practice,” the AACN (2006) outlines recommendations for a final capstone project that requires DNP students to apply knowledge gained in their academic coursework in order to ultimately develop a final work product that documents the attainment of DNP program outcomes. Practice change initiatives or quality improvement (QI) initiatives are two of the examples provided in this document as student capstone projects that highlight the clinical focus of the DNP degree. Although PhD-prepared nurses are trained to “conduct original research” (AACN, 2010), p. 5), DNP-prepared nurses are trained to “design, direct, and evaluate QI methods to promote safe, timely, effective, efficient, equitable, and patient-centered care” (AACN, 2006, p. 12). Although

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the AACN makes a clear distinction between a QI focus for the DNP and a research focus for the PhD, the distinction between these two scientific modalities can become blurry in practice. The format and requirements of DNP final work products (*capstone projects* in our program, but also known as *final projects*, *dissertations*, *theses*, or by other names at other institutions) vary widely across the United States, and the relative content of DNP and master's programs is in flux, so it is premature to draw conclusions about DNP programs in general. However, many DNP programs are struggling with the same issues (AACN, 2012). The University of Colorado, College of Nursing, was one of the first U.S. universities to offer the DNP and, as such, has had several years to design and revise the structure and procedures related to the capstone project. In the early years of our program, student capstone presentations varied widely in scope and quality. As a result, we have revised capstone course sequencing and content and have developed a review committee to ensure that projects are QI and not research, are well designed, and are written in accordance with SQUIRE guidelines (Davidoff, Batalden, Stevens, Ogrinc & Mooney, 2008). In this article, we describe our capstone process, in hopes that our experience will help some of the newer DNP programs in developing their own expectations and processes to help students demonstrate synthesis of their educational preparation.

### Distinction Between PhD and DNP

At our college, which also offers a PhD in nursing, the primary initial barrier to developing a quality capstone process was a lack of faculty understanding of the differences between the PhD dissertation and the DNP capstone. The AACN has published a document that specifically compares the two doctoral degrees in nursing (<http://www.aacn.nche.edu/DNP/pdf/conf/Regionals/Grid8-05.pdf>). Table 1 contrasts the scientific competencies identified by AACN for each degree, as well as areas of overlap: For example, both PhD and DNP nurses are expected to critically evaluate existing knowledge, use scientific methods to generate evidence, and participate in multidisciplinary teams. Both types of doctorally prepared nurses are also expected to take leadership roles, base their decisions on professional ethics, be

culturally competent, have relevant knowledge of nursing practice, mentor junior nursing colleagues, and serve as effective spokespersons in communicating disciplinary knowledge. The DNP competencies emphasize practice leadership including the use of information technology and data-based evaluation methods, although the PhD competencies also describe a need for nurse researchers to understand informatics, technology, and knowledge management in the current health care environment. Research, grant writing, and publication are emphasized in the PhD competencies, whereas the DNP competencies identify a need for scholarship to “disseminate findings from evidence-based practice and research to improve healthcare outcomes” (AACN, 2006, p. 12).

Because the distinction between QI and research can be subtle, faculty in our program initially used simpler but ineffective rules for differentiating between DNP and PhD work. For instance, some authors distinguish between PhD and DNP competencies in terms of the difference between basic (PhD) and translational (DNP) science (Vincent, Johnson, Velasquez, & Rigney, 2010), with the latter defined as effectiveness studies in real-world conditions (Chesla, 2008), or in Boyer's (Boyer, 1990) terms, between the “scholarship of discovery” (PhD) and “scholarship of application” (DNP). However, some PhD-prepared nurses may see themselves as applied researchers, and some DNP-prepared nurses may feel that these distinctions place them in the lesser position of applying others' knowledge, rather than being generators of new empirical knowledge based on their valuable practice observations and experiences.

Another approach initially used to differentiate between PhD and DNP programs was the likelihood of publication. Publishing, currently, is most common in research activities, and indeed, some institutional review boards (IRBs) have used publication as evidence that an activity is research. Therefore, some faculty members felt that it was inappropriate for DNP-prepared nurses to publish first-authored data-based manuscripts from their capstone evaluation projects. However, QI/evaluation activities also frequently result in lessons learned or “pearls for practice” (Newhouse, Pettit, Poe, & Rocco, 2006) that may have “limited-scope generalizability” and can be publishable despite the fact that these studies'

**Table 1.** Outcome Competencies Related to Research and QI for Nursing Doctorates

PhD (text from AACN, 2010)	DNP (text from AACN, 2006)
<ul style="list-style-type: none"> <li>• Critique and integrate different science perspectives in the conduct of research</li> <li>• Generate new ideas based on a critical evaluation of existing knowledge</li> <li>• Conduct original research</li> </ul>	<ul style="list-style-type: none"> <li>• Use analytic perspectives to critically appraise existing literature and other evidence to determine and implement the best evidence for practice</li> <li>• Develop and evaluate care delivery approaches that meet current and future needs of patient populations based on scientific findings</li> <li>• Design, direct, and evaluate QI methodologies to promote safe, effective, efficient, equitable, and patient-centered care</li> <li>• Develop, evaluate, and provide leadership for health care policy that shapes health care financing, regulation, and delivery</li> <li>• Disseminate findings from evidence-based practice and research to improve health care outcomes</li> </ul>
<ul style="list-style-type: none"> <li>• Assume leadership in the conduct of culturally competent scholarship to improve nursing practice</li> <li>• Communicate research findings to lay and professional audiences and identify implications for policy, nursing practice, and the profession</li> </ul>	

results are site specific (Lynn et al., 2007). QI/evaluation data may be of particular interest for dissemination when they justify an expense of public resources, illustrate a process of change, or demonstrate a particular method for clinical improvement (Newhouse et al., 2006). In fact, our program's DNP students over the past 5 years have been highly successful in publishing their capstone clinical evaluation project results. Lowe and Cook (2012) give suggestions on how to present the results of QI projects for publication.

Finally, the quality of scholarship or the specific methodology of the study has been used to differentiate between QI and research, leading some commentators to denigrate the DNP degree as “PhD-light” (Beckstead, 2010). However, with a few exceptions, methodological quality is not a reliable method for differentiating between QI and research:

[At one time, QI approaches] tested no hypotheses, generalized to no larger group, assigned no therapy, and used no highly sophisticated statistical and graphing tools. The last distinction, more symbolic than relevant, created an important psychologic distance between the two activities....With the advent of cohort creation as a quality assurance tool, the significantly enhanced sophistication of the statistical methods used, and the breadth and depth of the electronic database available, the superficial distinctions have vanished. We are now forced to confront the substantive differences.... (Bellin & Dubler, 2001, p. 1513)

Although research is usually defined as “a systematic investigation, including research development, testing and evaluation designed to develop or contribute to generalizable knowledge,” many of these aspects are not unique to research. QI projects involve “systematic, data-guided activities designed to bring about immediate improvements in health care delivery in particular settings” (Lynn et al., 2007, p. 667), and the related methods of program evaluation involve “the systematic collection of descriptive and judgment information necessary to make effective...decisions related to the selection, adoption, value, and modification of...activities” (Goldstein, 1980). Both QI and research are therefore data-based and systematic approaches to knowledge generation. Both use scientific methods to gather information and statistical tests to quantify results. However, experts agree that some distinctions can be made between the methods on the basis of whether an intervention is based on current best practices and offered as a standard of care to all patients going forward—in which case the activity is most likely QI—and whether it involves random assignment to conditions—in which case the activity requires opt-in informed consent and is almost certainly research due to the ethically necessary assumption that patients will not necessarily benefit from an intervention (Bellin & Dubler, 2001; Cook, 2010; Lynn et al., 2007; Robinson et al., 2005).

## Faculty Perspectives on DNP and PhD Scholarly Work

We conducted an on-line survey with faculty at our college of nursing in 2008 to gather information about faculty members' expectations for doctoral work products by students in each of our degree programs and develop a shared faculty understanding of the differences between QI and research. Faculty respondents (17 of 69 sent an electronic invitation [25%]) taught in the PhD program (3), the DNP program (3), both doctoral programs (6), or other nondoctoral nursing programs (5). The survey included 24 criteria drawn from grading rubrics and PhD or DNP faculty discussions. Survey respondents used a 5-point Likert-type scale to rate each criterion's applicability to PhD and/or DNP doctoral work products (Figure 1). Full results are available from the authors on request.

Figure 1 shows box plots for all quantitative survey items, where wider boxes and longer tails indicate more diversity of opinion among the surveyed faculty members. Criteria that faculty considered more appropriate for PhD doctoral work products included conducting a study with strong internal validity, developing and testing predictions of nursing theory, and, to a lesser degree, studying phenomena of interest to federal funders such as the National Institutes of Health (NIH), creating new methods or technologies, and conducting tests for statistical significance of results. Items that faculty considered more typical of DNP doctoral work included consulting with an interdisciplinary team, conducting a study with strong external validity, analyzing current policy related to the student's topic area, presenting policy implications of the project, designing processes or programs to improve over standard care, and applying new methods or technologies in practice. A broader range of methods was considered appropriate for DNP work, with some respondents specifically commenting that advanced statistical analyses are even more necessary to correct for confounds in nonrandomized designs. Studies in practice or community settings were generally considered more appropriate for the DNP, consistent with a greater focus on external validity in this type of project. However, some respondents considered community-based projects more appropriate for the PhD.

In addition to these differences, faculty respondents identified many factors as being important for a high-quality doctoral work product in either the DNP or the PhD programs. For example, a student's ability to collect data relevant to practice, analyze literature, interpret new results in light of existing knowledge, and identify gaps or limitations in his or her own work were considered important for doctoral work products in both degree programs. Whether a project created new knowledge or translated existing knowledge into practice was not seen as a strong differentiator, although there was some support for “creating new methods or technologies” as a more important characteristic of PhD work and for “designing processes or programs to improve over standard care” as a more important characteristic of

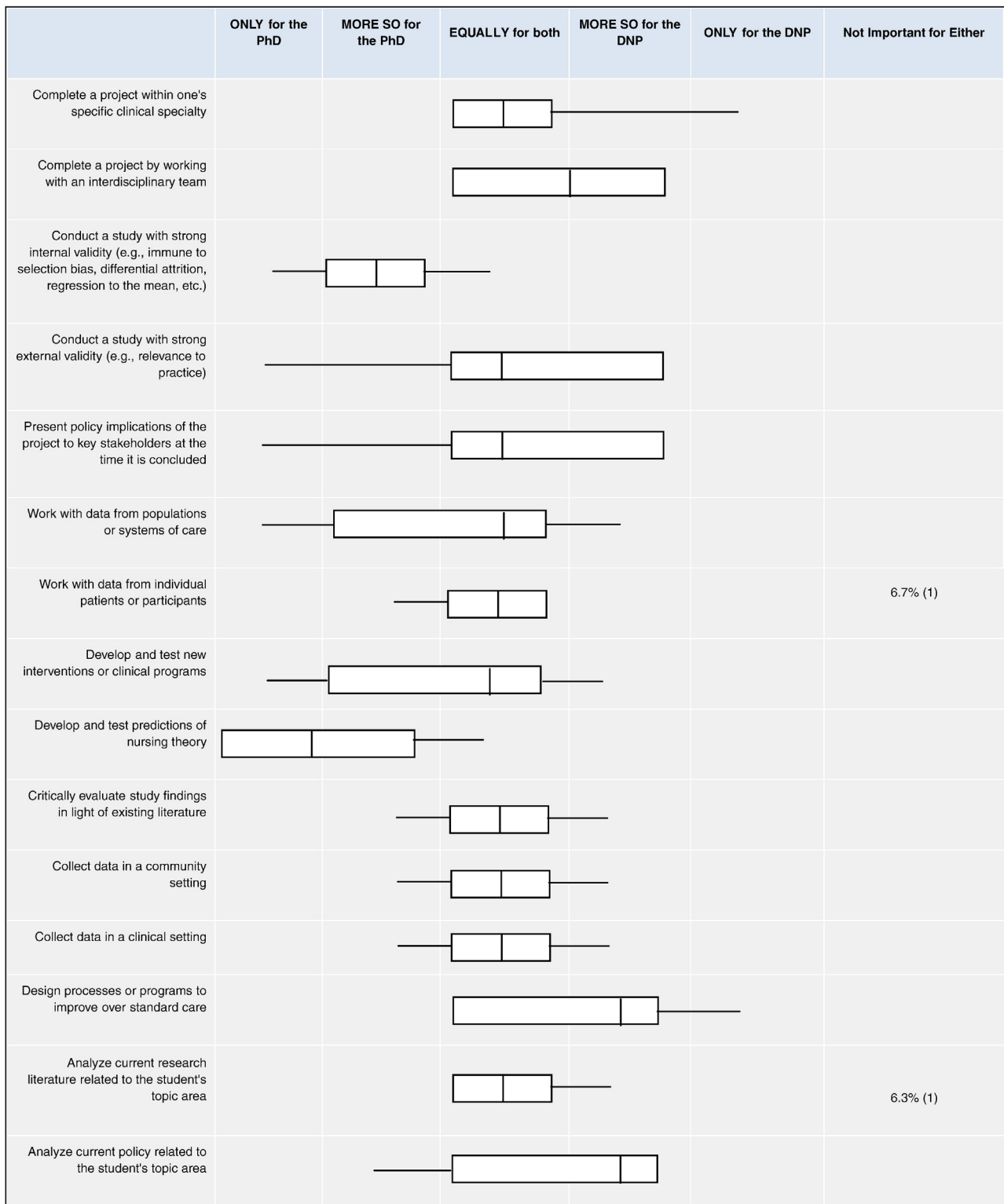


Figure 1. Results of faculty survey on PhD versus DNP doctoral project characteristics.

DNP work. These activities both involve creating and testing new practice approaches, and the process of generating new evidence through data collection was seen as equally characteristic of both degrees. The role of nursing theory was seen as more central in PhD doctoral work and may be important in differentiating between

new methods for the PhD and novel processes or programs for the DNP.

### Criteria for DNP QI Projects

Overall, our review of the QI/research distinction led us to differentiate between these scientific modalities based

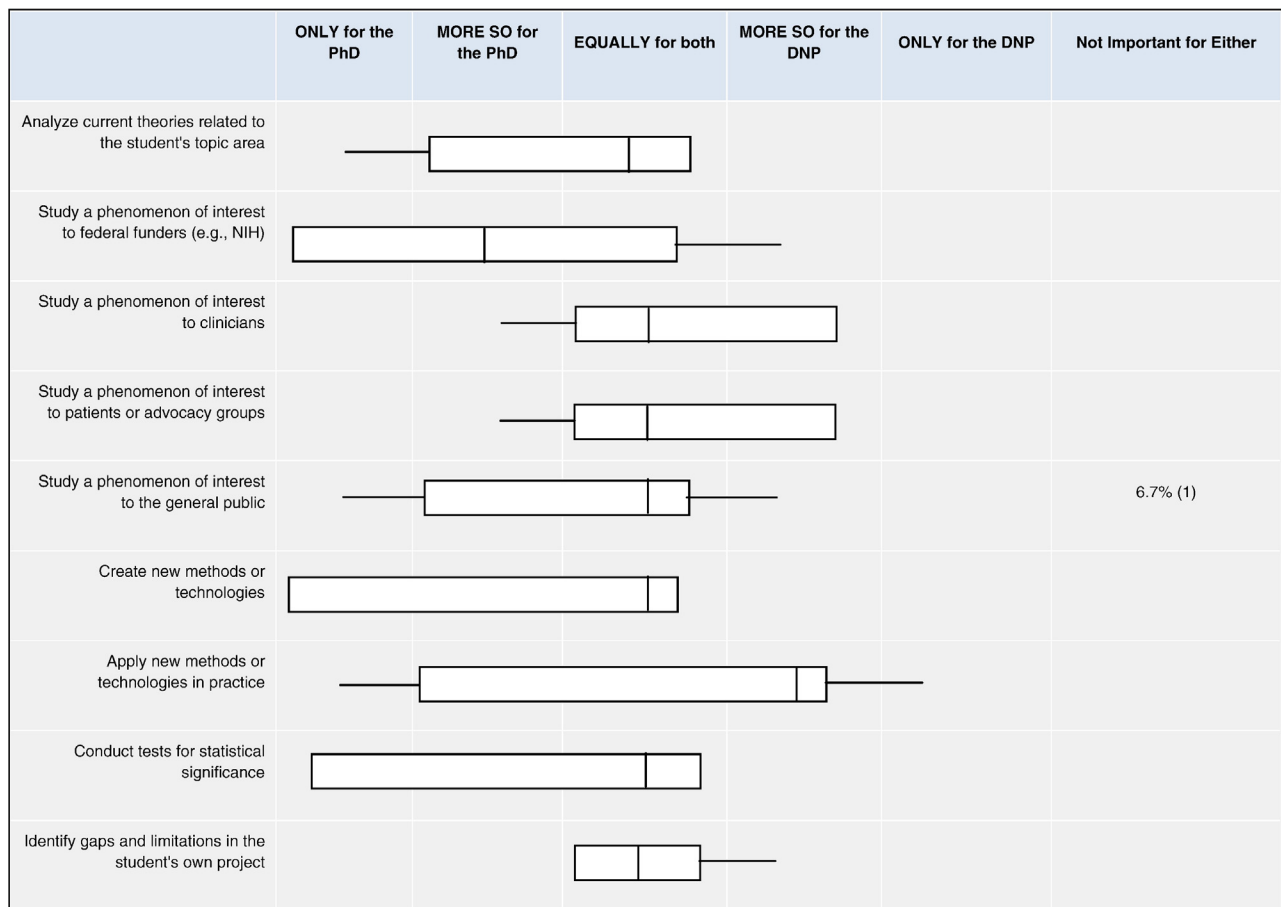


Figure 1. (continued).

on whether a project was designed to create new, generalizable knowledge (the Federal definition of *research*) or to measure and improve adherence to existing best practices in specific care settings (our working definition of *QI*). Specific criteria for making this distinction have been proposed by Cobb and Moberg (2008) and by Lowe and Cook (2012). Although the AACN provides several examples of capstone project ideas that give students an opportunity to synthesize their educational preparation, we decided, based on the key aspects of DNP preparation identified above, to insist that our students' capstones be QI projects. Qualitative research provides an interesting test case for the QI/research distinction in that this type of investigation does generate new knowledge but is not intended to generalize to a broader population; because qualitative research focuses on theory generation and testing and uses specialized methodologies not included in our DNP curriculum, we do consider qualitative studies to be research rather than QI. DNP students might include a few open-ended questions in their evaluation of a QI project and present these results anecdotally, but we discourage our DNP students from conducting actual qualitative research. Similarly, although meta-analyses are an excellent source of evidence on which to base practice decisions, conducting a meta-analysis generates new knowledge and uses specialized research techniques. We therefore do not consider meta-analyses to be

appropriate final DNP work products. QI projects require students to demonstrate mastery of each of the eight DNP essentials (AACN, 2006). Table 2 lists our program's project requirements for QI activities and their corresponding DNP essentials.

To verify that DNP students' capstone clinical evaluation projects meet the definition of QI rather than research, we instituted a college-level review committee to review student projects prior to implementation. Our committee uses a checklist developed by the NIH-funded Clinical and Translational Research Institute at the University of Wisconsin-Madison to differentiate between QI, research, and program evaluation (Cobb & Moberg, 2008). Committee members include two faculty who teach in the PhD program and several who teach in the DNP program, with some faculty involved who are actively funded researchers and others who are clinical practice faculty not previously involved in the DNP capstone course sequence. In addition to verifying that DNP students are engaged in QI rather than research, our development of a college-level review committee has led to interesting and spirited discussions among faculty about scholarship by students in both our doctoral programs, contributed to a better shared understanding of QI and research among our faculty members, encouraged faculty to think about what makes a QI project valuable in improving practice, and helped to mentor new faculty into advising roles for DNP students.

**Table 2.** Match Between DNP Capstone Project Requirements and DNP Essentials

Capstone project requirement	DNP essential
Critique current system using the CCM or PCMH and identify potential areas for improvement.	Essential 1: Scientific underpinnings for practice
Identify a population toward whom the project will be directed and investigate health issues relevant to that population.	Essential 2: Organizational and systems leadership for QI and systems thinking
Work with system's leaders to identify the organizational mission and annual goals and ensure that the project aim is consistent with these organizational priorities.	
Become a member of the organization's QI committee and lead efforts with this committee that are related to the capstone project.	
Prepare a budget for and analyze the cost-effectiveness of the proposed interventions.	
Perform a literature search related to your capstone project and determine the level of evidence of support for your planned interventions.	Essential 3: Clinical scholarship and analytical methods for evidence-based practice
Use historic and national benchmarks to set project goals and measure progress.	
Prepare a QI proposal and submit it to an internal review board for approval.	
Use data mining techniques for obtaining benchmarking data, preparing monthly dashboards and report cards, and evaluating outcomes and process measures.	
Prepare a publishable manuscript describing the QI project and findings.	
Use information technology to capture QI data and create mine-able documentation tools and data collection forms.	Essential 4: Information systems/technology and patient care technology for the improvement and transformation of health care
Regular attendance and demonstrated leadership at organizational policy and QI meetings.	Essential 5: Healthcare policy for advocacy in health care
Participate in state and national meetings related to the identified population's health care issues.	
Adapt practice guidelines and develop practice standards for the organization as part of the QI project.	Essential 6: Interprofessional collaboration for improving patient and population health outcomes
Work with the interdisciplinary committee to communicate and facilitate integration of these standards into daily practice within the organization.	
Evaluate the current organizational system, with the interprofessional team, using the CCM or PCMH models.	
As part of the background for the project, analyze the health needs of the selected population using epidemiologic or biostatistical health data.	Essential 7: Clinical prevention and population health
Currently, all students must be certified advanced practice nurses before being able to begin their DNP capstones projects.	Essential 8: Advanced nursing practice

Note. CCM = chronic care model; PCMH = patient-centered medical home.

A further benefit came from discussions with our campus IRB about the regulatory review needed for human subjects involvement in QI studies. Based on the Common Rule for [human Subjects Protection \(1991\)](#), IRB review is required for all research studies that involve living human participants. However, our IRB was willing to make a determination of “not human subjects research” for any project classified as QI based on the argument that QI is *not research*. In other words, although QI projects include living human subjects, they are not “human subjects research” per the Federal definition and therefore are exempt from the requirement for IRB review.

QI projects are also specifically exempted from patient confidentiality regulations in the Health Insurance Portability and Accountability Act. Determination that a project is QI therefore considerably reduces the

amount of regulatory review needed for our DNP students' clinical capstone evaluation projects, making it easier and faster for students to implement changes in care that directly benefit patients. Our IRB revised their review procedures for QI projects in stages, first using a checklist to verify that projects were QI rather than research; next relying on an investigator's declaration that a project is QI based on its goals, methodology, and plan for dissemination; and finally, delegating responsibility for determining that a project is QI to the college for review of our own students' proposals.

The college-level committee addresses important professional and ethical issues such as confidentiality and informed consent to health care that must be addressed in QI activities with human participants. The exemption from IRB regulation simply means that these

requirements can be met using less intrusive and more clinically appropriate procedures than the type of consent and oversight process required for optional research procedures with no clear expectation of benefit.

We have worked closely with our IRB to ensure that review procedures are appropriate and that we are identifying projects as QI in the same way that IRB reviewers would. This partnership has also benefitted our IRB by reducing the number of protocols they review that are outside their scope of responsibility, as they are officially charged to review research and not QI. Some of the hospitals that partner with our campus have now also developed internal review committees to determine whether projects are QI and therefore exempt from IRB review requirements, and we are working with these partner organizations to ensure that criteria are applied consistently when our DNP students conduct a QI project at one of their facilities.

The committee understands that the plan–do–study–act (PDSA) rapid-cycle change process (Institute of Healthcare Improvement [IHI], 2012) is used to design and change interventions as a QI project proceeds and that interventions cannot be completely prespecified and manualized as they would be in a research study. Therefore, students are asked to present a menu of possible interventions for improvement at this point in project development and are instructed to stay in close contact with their faculty advisor as the QI process unfolds. Students are often asked to make revisions to their protocol summary after meeting with the committee. Advisors are content experts who guide students through required changes, ensure that the project is consistent with best practices, and utilize evidence-based practice guidelines to steer interventions.

### Current Course Sequence for Capstone Projects

The University of Colorado's capstone project evolves through a four-course series over 18 months. Several changes to the course sequence and competencies have been made over the past 5 years. The current course structure and sequence is shown in Table 3.

The first course in this capstone sequence provides much of the didactic content related to systems assessment and QI methods. The *Healthcare Quality Book* (Ransom, Joshi, Nash & Ransom, 2008) is used as a resource with supplemental videos and documents from IHI providing additional educational support. Students begin their capstone projects by aligning themselves with a clinical agency and becoming an active participant in the agency's QI department and efforts. They identify a population to target for their QI work and learn about quality indicators that are tracked by their organization for that particular population. Organizational benchmarks are compared to national or regional benchmarks to identify an area to target for improvement efforts. In addition, students complete either the Assessing Chronic Illness Care organizational assessment tool (<http://www.improvingchroniccare.org/>

**Table 3.** CU's Current Capstone Course Sequence

Course title and content
Context of patient, population, and practice management
<ul style="list-style-type: none"> <li>• Identify a capstone project</li> <li>• Create a multidisciplinary team at the clinical institution</li> <li>• Establish project benchmarks and existing best practices based on the literature</li> <li>• Begin to develop program improvements using the PDSA process</li> <li>• Write the first draft of a project proposal to include:               <ul style="list-style-type: none"> <li>◦ AIM statement</li> <li>◦ Brief background/rationale for project</li> <li>◦ Methods for improvement</li> <li>◦ Outcome measures</li> <li>◦ Evaluation plan</li> </ul> </li> </ul>
Milestone 1: College committee meeting to approve project
DNP capstone proposal
<ul style="list-style-type: none"> <li>• Receive approval or make changes based on feedback from the college review committee</li> <li>• Continue to implement project interventions using PDSA format</li> <li>• Continue to add data points to the control chart</li> </ul>
Milestone 2: College committee reconvenes to review projects that were not approved at first meeting
DNP role residency
<ul style="list-style-type: none"> <li>• Develop the background for the project               <ul style="list-style-type: none"> <li>◦ Finalize the specific problem description based on organizational needs assessment and literature review</li> <li>◦ Investigate approaches to the problem identified in the literature to date</li> </ul> </li> <li>• Develop a theoretical framework for the project (unlike the PhD, the theory is not tested but provides a structure for the project)</li> <li>• Refine interventions and continue to implement interventions using PDSA methodologies</li> <li>• Continue to add data points to control charts</li> </ul>
DNP capstone project
<ul style="list-style-type: none"> <li>• Complete the project and present it in a DNP conference at the end of the semester</li> <li>• Work closely with faculty advisor and course faculty to refine the project description</li> <li>• Analyze data—quantitative and/or qualitative</li> <li>• Prepare a manuscript describing the project according to the SQUIRE Guidelines</li> </ul>
Milestone 3: Approval of manuscript by advisor and course faculty
<ul style="list-style-type: none"> <li>• Develop a presentation to share the results of the project</li> <li>• Attend practice day</li> </ul>
Milestone 4: Present DNP scholarship to students and faculty

[index.php?p=ACIC\\_Survey&s=35](http://www.improvingchroniccare.org/index.php?p=ACIC_Survey&s=35)), which assesses organizational strengths and weaknesses using the chronic care model as a guide or the National Center for Quality Assurance's Patient Centered Medical Home Content and Scoring System (<http://www.ncqa.org/tabid/631/Default.aspx>), to identify areas for improvement at their clinical agency. By the end of this course, students are expected to have identified a clear project aim, patient outcomes, and process measures and to have prepared the first draft of a project proposal for the DNP faculty committee to review.

If the committee is dissatisfied with the overall project aim, outcomes, process measures, or the scope, the

student spends time during the next course improving the proposal. He or she will still be able to improve collection of benchmarking data and perform interventions based on an original root cause analysis, as long as the committee decided that the project was not research. In these cases, a revised proposal is rereviewed by the committee at the end of the second course.

The PDSA cycles continue throughout the series until midway through the final course when data analysis and project wrap-up commences. In the role residency course, students delve into the professional literature to gather extensive background information for their evolving projects. Interventions may be modified or created based on this literature review.

### **Barriers and Solutions to Quality Capstone Projects**

In the early days of our college's DNP program, faculty was divided in its support for the program and voiced confusion about expectations for the capstone project. Students in the DNP program have always shared their capstone projects with colleagues, faculty, other students, organizational leaders from their clinical sites, friends, and family during a final capstone conference that occurs just before graduation. Some faculty members who were untrained in the QI processes judged these projects through a research lens and were often critical. To enhance communication and understanding, faculty in the DNP program reached out to all faculty by offering "brown bag" lunchtime educational sessions in QI methods; the distinctions between research, QI, and program evaluation; and the capstone course sequence. Faculty members were encouraged to dialogue about the capstone project objectives and course sequencing as well as the role of the faculty advisor. To help faculty gain familiarity with the DNP capstone project, all faculty have been invited to serve in an advisory role to DNP students based on their clinical interests and expertise. Faculty in the capstone course sequence actively encourage students to seek out faculty advisors with relevant clinical expertise regardless of whether those faculty teach in our DNP, PhD, master's, or bachelor's degree programs. The role of the advisor has continued to evolve as faculty become more familiar with the process. By becoming a part of the process, faculty members have become more enthusiastic about the DNP capstone experience and more eager to serve as student advisors.

We have struggled with the sequencing of courses in the capstone project sequence. Students were often told by faculty familiar with research protocols and unaware that these projects are exempt from IRB review that they could not begin any interventions until after they obtained IRB approval. The result of this misinformation was the cessation of all clinical activities related to the project for almost two full semesters, during the second and third courses, while students wrote up their protocol and awaited IRB review. Ultimately, students would present results for only a few months of actual project

work due to this delay. Initially, the course that required submission of the final IRB application occurred third in the four-course sequence. With the move to internal review of DNP students' QI projects, it was felt that the process needed to occur at the completion of the first course. The subsequent coursework during the second semester (DNP proposal course) now involves revision of the QI project application with any changes required by the review committee. While the overall work and content of each course were unchanged, the sequence was better aligned to allow students to continue to gather data and work on changes to care delivery based on knowledge gained with each PDSA cycle. Faculty advisors were introduced earlier as a result of these changes and now have a stronger role in assisting students through the QI process.

Another problem encountered during the first few years of the program involved students switching from one agency and project to another. This compromised the quality of their capstone projects for many reasons: (a) time available for the project was limited, which compromised the project's quality and limited its scope; (b) critical background work done in Course 1 was not repeated for the new project, resulting in inadequate teamwork, benchmarking, and support by leadership; and (c) there was an assumption that the student's work was continuous, but there was no process for ensuring that this was the case, resulting in very uneven quality of DNP students' final presentations. This problem emerged because we had no formal process by which project plans could be shared from one course instructor to the next. The instructor for the second course had no idea what the student had done or proposed as a final project in the first course. Students who were lacking in clinical experience and organizational loyalty were most prone to switching projects and tended to produce lower quality work. To address this, the faculty continued to work on course sequencing and communication with students about capstone project expectations. Communication between faculty from one course to the next was enhanced through regular review meetings between semesters and most recently by the formation of an internal review committee that meets at several points to approve DNP students' QI projects. All students now have an individual meeting with the faculty member for the first capstone course, during which they are told that they are expected to commit a sustained 18 months to a single project and that failing to commit to sustained work will likely result in the need to repeat the course sequence. The clinical agency is also informed about the length of the project and asked to commit to this sustained effort. By formalizing the course progression and involving all capstone course faculty as well as the faculty advisor in the review of QI projects, student work is monitored consistently throughout the sequence. Activities of one course are carried through to the next so that students have more time to design and implement effective interventions and observe changes in patient care.



## Doctoral Program Outcomes

Table 4 shows exemplars of high-quality student work from recent PhD and DNP graduates at our university, identified based on a project's selection for a student award or acceptance for peer-reviewed professional publication. Common threads in the outstanding PhD projects were tests of nursing theory and the use of predictive modeling approaches such as mediation analysis or multilevel modeling, or alternately the use of qualitative analysis techniques. Common characteristics of exemplary DNP projects were intervention delivery in specific practice settings and evaluation of patient care outcomes. Sample characteristics alone do not show a clear generalizability advantage for one type of project or the other—in fact, one of the exemplary PhD projects and one of the exemplary DNP projects were conducted in the same population of women with breast cancer at our university's NIH-funded cancer center. PhD projects may ultimately have greater generalizability because their conclusions are drawn at the level of nursing theory rather than in terms of practice improvements at a specific site; DNP projects tested concrete practice improvement strategies that may have greater direct relevance to practitioners. Methodological quality was high in all of these studies based on their acceptability for awards or publication, although none of the studies in either program used random assignment. All of the studies had limitations, but none had notable internal validity flaws. All of the studies focused on clinically relevant topics with the goal of informing practice.

As highlighted in these examples, the differing competencies of PhD and DNP nurses are both likely to be valuable in the current health care environment.

QI/evaluation approaches are ideally suited for evaluating outcomes, identifying best-practice programs, testing the use of existing interventions in new settings or populations, and assessing new technology. Because of the strong current focus on evidence-based practice in all areas of health care, QI/evaluation activities should be better funded, better designed, and more consistently implemented by practice experts like DNP nurses. Research, on the other hand, is most likely to lead to significant paradigm shifts in health care by explicitly testing new theoretical propositions. Because research dollars are limited at the societal level, funders like the NIH and the Agency for Healthcare Research and Quality may wish to look more critically at research proposals that test existing care strategies for new patient groups using randomized controlled trial methods; in these cases, clinically useful evidence might be generated more efficiently and cost-effectively with a QI/evaluation approach.

## Continued Challenges

Our DNP program has graduated several classes of students to date. With each class, faculty have learned new lessons about ways to facilitate effective student progression. One of the greatest challenges has been working with students through the capstone courses to enable their successful completion within the time frame of the course structure. The use of a course sequence to support students' progression, rather than an open-ended format like dissertation credits with milestone events such as a final defense, imposes a standardized set of expectations for progression that some students are unable to meet. As we evolve, we continue to struggle with this problem. After adjusting the course sequencing,

**Table 4.** Exemplars of High-Quality PhD and DNP Doctoral Work Products

Degree	How identified as an exemplar	Project description
DNP	Recipient of 2010 outstanding DNP student award	Developed an anticoagulation clinic to improve the percentage of patients with lab values in therapeutic range and to decrease ED visits and hospitalizations based on adverse reactions to anticoagulant drugs.
	Study published in a high-quality peer-reviewed scientific journal	Evaluated outcomes of including a care navigator in an ambulatory breast cancer clinic based on time from diagnostic biopsy to first consultation with a specialist, before versus after program implementation.
	Project highlighted as an important practice innovation in local media reports	Improved rates of postpartum depression screening in a midwifery practice through educational initiatives and inclusion of a screening tool in the electronic medical record.
PhD	Recipient of 2009 outstanding dissertation award	Tested a novel theory predicting self-management behaviors of women with breast cancer from a theory-based inner strength scale developed in the student's prior research, including tests for mediators of inner strength's effect on self-management.
	Study published in a high-quality peer-reviewed scientific journal; student selected for a prestigious postdoctoral fellowship	Used multilevel modeling to predict patient safety indicators (infections, medication errors, etc.) based on nurses' education and certification, hospital unit type, and workload variables, using a multistate data set on individual units within hospitals.
	Study funded by an NRSA predoctoral award from the NIH	Qualitative study to describe the role of faith communities in preventing childhood obesity.

Note. NRSA = National Research Service Award; ED = emergency department.

involving the faculty advisor early in the process, and the new internal review process, we believe that we have optimized the students' ability for timely project completion within a course framework.

The role of the advisor has continued to evolve as we include more faculty members in the process and engage their services earlier in the sequence. There is occasional confusion about who should be responsible for grading within each course, the advisor or the course instructor. The faculty of record for the course is ultimately the person who determines the course grade, but the advisor has a key role in assisting the student with project tasks that serve to partially fulfill course requirements. We have developed and continue to refine a grading rubric for the final paper in the final course, which is currently tied to the SQUIRE publication guidelines (Davidoff, Batalden, Stevens, Ogrinc & Mooney, 2008), to provide clarity for both the student and the advisor about expectations for the final capstone product. Students are expected to develop a publishable manuscript that complies with SQUIRE guidelines and to identify a journal that would potentially be interested in their project description. Our grading rubric reflects these requirements as well as the DNP essentials set forth by the AACN.

As with any new curriculum, the work involved in developing and improving courses is not reflected in faculty workload. Furthermore, neither faculty advisors nor members of the internal DNP committee are given workload credit for their involvement with individual student projects. This is congruent with college policies related to advisory work in the PhD program, where this work is credited as service to the CON. One important difference between the two programs is that many more students are enrolled in the DNP program, with no greater number of faculty who can serve as advisors and committee members. The course structure ensures that course faculty receive workload credit for their role while teaching the assigned course, but not for the sustained involvement across the four-course sequence required by our current process. Currently, faculty teaching the four capstone courses are actively involved with students throughout the sequence as part of the courses, as faculty advisors, and as part of the internal review process. As DNP enrollment increases, the sustainability of these workload requirements will need to be reassessed.

Currently, we are optimistic about the progress we have made and believe that we have addressed many of the challenges we faced in developing a course sequence that supports our DNP students' completion of high-quality QI projects for their capstone paper requirement. The fact that one third of student projects have been published or presented at national conferences, 25% submitted for publication with two thirds of these accepted, and the fact that faculty feedback about student presentations has become markedly more positive over time are trends that support our optimism. As new DNP programs grapple with the arduous task of structuring a

capstone process that supports quality projects, our experience may serve as a guide for program planning and development.

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