

AACP REPORT

Building Implementation Science Capacity in Academic Pharmacy: Report of the 2020-2021 AACP Research and Graduate Affairs Committee

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Keywords: implementation science, competencies, practice transformation, curricular transformation

EXECUTIVE SUMMARY

The 2020-2021 AACP Research and Graduate Affairs Committee (RGAC) continued the work begun by the 2019-2020 RGAC to increase awareness of and capacity for implementation research to advance practice transformation in academic pharmacy. AACP President Anne Lin charged the RGAC with developing resources and programs for training faculty and graduate students in implementation science. The committee was further charged with developing a mechanism to pair pharmacy faculty and implementation experts on practice advancement projects. In its work, the committee focused on generating near-term opportunities for pharmacy practice faculty to pursue projects while developing programs that would support ongoing career development and future implementation practice and research by pharmacy faculty and trainees.

To support training, the RGAC developed a competency framework for graduate education that builds on the six domains of graduate education in pharmaceutical sciences put forward by the 2016-2017 RGAC. The new, specialized framework identifies and organizes those competencies that should be cultivated to successfully pursue implementation research in pharmacy, with utility beyond graduate education. The identified competencies could act as the base for pharmacy-specific implementation science training materials suitable for faculty development. The committee proposes a faculty development program that leverages the framework and existing implementation science training resources offered by federal agencies and universities to provide facilitated learning opportunities and peer support for faculty who wish to pursue implementation research.

The committee considered multiple approaches AACP could take to promote collaboration between pharmacy faculty and implementation experts. While recognizing the importance of individual development support for pharmacy faculty, the committee felt that a focus on supporting interdisciplinary teams that span practice and research and engage faculty, trainees and preceptors would have the greatest impact on enabling practice advancement projects in the near-term while increasing capacity in the long-term. The committee envisions a program in which AACP creates opportunities for pharmacy faculty and implementation experts to come together with the purpose of matching researchers and projects. AACP support for these collaborations should begin prior to any such matching event, for example by helping pharmacy faculty articulate the scope and value of their proposed practice advancement projects, and extend beyond the initial match to include assisting nascent collaborations establish connections and secure institutional and external backing.

The RGAC made specific recommendations to AACP about how the framework and proposed programs could be used to further develop pharmacy faculty and graduate students as researchers while advancing the goal of sustainable transformation of pharmacy practice. A key recommendation is that AACP cultivate an inclusive community of interest in implementation science in pharmacy that will promote adoption of the framework, act as facilitators and coaches for training programs and assist in planning and supporting collaborative research projects.

INTRODUCTION AND COMMITTEE CHARGES

The Research and Graduate Affairs Committee (RGAC) of the American Association of Colleges of Pharmacy assists in the development of the research, graduate education and scholarship agenda of the Association.¹ Beginning in

2019, the RGAC has considered implementation science (IS) as a tool to advance curricular and practice transformation within pharmacy. The 2019-2020 Committee recommended that AACP work to increase awareness of and capacity for implementation research in academic pharmacy, as a means to enhance faculty scholarship and increase the impact of practice transformation efforts.²

AACP President Anne Lin charged the 2020-2021 Committee with continuing that work by developing resources for AACP and pharmacy schools to train graduate students and faculty in IS and developing opportunities for pharmacy faculty to utilize IS in their practice advancement work. President Lin also charged each committee with reading the reports of all 2019-2020 committees, to identify elements of those reports that could inform the work of the 2020-2021 committees, and identifying salient activities for the proposed Center for Academic Innovation and Practice Transformation (hereafter referred to as the Center), for consideration by the AACP Strategic Planning Committee and AACP staff. These shared first and last charges of each committee were intended to promote continuity of committee output, including recommendations and policy statements, across years and focus areas. President Lin's complete charges to this committee were:

1. Read all six reports from the 2019-20 AACP standing committees to identify elements of these reports that are relevant to your committee's work this year.
2. Develop a competency framework for graduate education and training in IS in colleges and schools of pharmacy.
3. Develop a micro-credentialing or badge process for IS that can be offered by AACP.
4. Develop a mechanism by which AACP members can be paired with IS experts on an identified practice advancement project on an annual basis.
5. From your work on this year's charges, identify salient activities for the Center for Academic Innovation and Practice Transformation for consideration by the AACP Strategic Planning Committee and AACP staff.

The committee met virtually every other Tuesday from September 2020 to March 2021. Travel restrictions due to COVID-19 prevented an in-person meeting of the committee, and the committee scheduled additional, extended (2-hour) meetings on October 16 and 23. President Lin joined the committee on October 23 to discuss the intention behind and interpretation of the charges. During this discussion, the goal of Charge 4 was clarified as being to generate near-term opportunities for pharmacy practice faculty to pursue projects that advance sustainable practice transformation. President Lin and all standing committee members met on January 14, 2021 to share updates on committee progress and identify areas of shared interest and potential collaboration between committees. The AACP staff liaisons for each standing committee also met monthly throughout the year to provide updates on committee progress and share planned committee activities and potential recommendations and policy statements. Through these conversations and the shared first charge across committees, this committee and the Student Affairs Committee identified professional identity formation as an emerging area that would benefit from application of IS methods during its adoption within pharmacy education and also provides an area of study for pharmacy faculty interested in developing as IS researchers.

BACKGROUND

The 2020-2021 committee charges reflect AACP's ongoing priorities related to graduate education, research opportunities for pharmacy practice faculty, and pharmacy practice transformation. Beginning with an extended 2014-2016 committee period, the RGAC focused its work on the development and promotion of a competency-based model for graduate education.³ This work included the development of a core set of competencies, organized around six domains that provide a competency framework for pharmaceutical graduate education.⁴ These domains are 1) foundational knowledge, 2) research, 3) scientific communication, 4) education, 5) leadership and management, and 6) personal and professional development. The foundational knowledge domain will consist of competencies that are highly specific to a given field of study. Within the remaining five domains many competencies are shared across fields, but there are also competencies specific to or of increased importance in some fields. For Charge 2, the committee identified those competencies graduate students should cultivate for implementation research in pharmacy.

As indicated above, Charges 3 and 4 follow on the recommendation of the 2019-2020 committee to increase capacity for IS research among pharmacy faculty. These charges also provide an opportunity for AACP to act on a finding from the 2018-2019 committee's survey of pharmacy faculty on research leadership development needs. This survey found that some residency-trained pharmacy faculty lacked full confidence in their readiness to take on research leadership roles.⁵ Programs and mechanisms that can facilitate research by this group have the potential to both aid their scholarship and advance the goal of practice transformation.

A COMPETENCY FRAMEWORK FOR IMPLEMENTATION SCIENCE

The committee first approached their second charge, to develop a competency framework for graduate education and training in implementation science, with a general discussion of the target audience and possible structure of a

framework. Clarification of charges was sought from President Lin in October. A literature review was conducted to review similar frameworks,⁶⁻¹² and subsequent committee discussion assessed the relative advantages and disadvantages of each. These frameworks shared common components and structure. However, they lacked the flexibility needed to be adaptable by diverse pharmacy schools and therefore were not well-suited for our purpose of supporting pharmaceutical graduate education. The decision was made to develop a new competency framework informed by these existing ones, in alignment with the existing graduate education competency framework developed by AACP and specific to the needs of academic pharmacy's stakeholders, including faculty, students and clinical partners. Brainstorming and concept mapping of critical IS competencies and discussion regarding effective framework structure led to a draft competency framework with five domains (Planning, Study Design, Evaluation, Dissemination, and Cross-cutting). In parallel with this process, the committee identified IS experts in pharmacy who could be contacted to provide feedback on the draft framework, and who might also serve as skilled experts and research partners for the programs developed in Charges 3 and 4. Additions to this list were made based on suggestions elicited from IS experts via the survey described below. The list of IS experts will be shared with the Center, as called for in Charge 5.

The RGAC members then divided into subgroups, with Subgroup 1 tasked with further refining the draft framework and eliciting feedback from IS experts on the clarity, relevance, and structure of the framework. To gather multiple viewpoints from IS experts, the subgroup decided to develop and launch a survey of IS experts in pharmacy, revise the framework based on respondent feedback, and conduct a focus group to further refine the framework. A review of the competency framework revealed a need to consider places where there may have been duplication, reorder the list in a more logical order within each domain, and to combine various competencies where appropriate. Subgroup 1 accomplished this task and the result was then forwarded to the full committee for additional review and feedback.

Survey of IS Experts

An electronic survey was conducted in December 2020 with 24 IS experts identified by the committee. The survey instrument was developed in Qualtrics, and an invitation with a unique survey link was sent to each expert via email. Reminders were sent twice to experts who had not yet responded. The survey was left open for over three weeks to allow for maximum response. The survey contained an introduction stating its purpose (to elicit feedback on a draft of a new Implementation Science Competency Framework intended to guide pharmacy graduate programs who wish to integrate IS competencies into their existing graduate program, or to assist programs that are contemplating a new IS focus.) A link to a pdf version of the competency framework was also provided.

The survey instrument was structured as a combination of 5-point Likert-type scales and open-ended questions. Likert-type scales were used to assess level of clarity (very clear to not at all clear) and relevance (very relevant to not at all relevant) of each competency within each domain. For each of the five domains, an open-ended question asked how clarity and/or relevance could be improved for the competencies within that domain. Additional open-ended survey items elicited feedback on the overall structure of the competency framework and whether any competencies or domains were missing from the framework. There were also questions asking whether the respondent would be willing to participate in a focus group to provide feedback on the next iteration of the framework, and an item asking for names and contact information of any other experts who might also provide feedback on the framework (Appendix I.)

Ten completed responses were obtained from the survey (42% response rate). Descriptive statistics were used to characterize findings from the Likert-type scales. Responses from open-ended survey items were reviewed and discussed by all committee members and major findings were identified through discussion and consensus.¹³ Quantitative and qualitative findings were reviewed by committee members and reported by the chair, and a plan for incorporating feedback into framework revisions was discussed. In general, clarity of the wording of competencies was rated highly, with the exception of a couple of competencies that needed more detailed descriptions (Appendix II.) Relevance was rated lower for competencies perceived as not specific to IS and for those competencies in the Cross-cutting domain. Major themes from the open-ended survey items were related to the specificity of general research competencies to implementation science and the ambiguity of some terminology. Survey respondents also questioned the overall organization of the framework. Coupled with qualitative feedback regarding issues with this domain, these results led the committee to seek further feedback from experts. Subsequently, Subgroup 1 met to further discuss framework revisions to ensure that feedback was adequately incorporated. The revised version of the framework was sent to the committee for review and comment, then finalized in preparation for the focus group.

Focus Group

Five IS experts agreed to participate in the focus group, which was held via Zoom on January 27, 2021. Participants received an email invitation with Zoom link and were provided with a pdf of the revised framework to review prior to the meeting. The 90-minute session included a facilitated discussion of survey feedback, guided by semi-

structured questions. One subgroup member facilitated the discussion while others took notes to supplement the audio and video recording of the meeting (Appendix 3.)

Focus group participants felt, in general, that the framework should contain only competencies that are specific to IS, and suggested appending a preamble to the framework explaining the assumption that basic research knowledge and skills are in place prior to use of these competencies. In regard to structure, participants suggested that competencies in the Cross-cutting domain could be worked into the existing domains, and that the Study Design and Evaluation domains could be combined. They also suggested that a domain be added related to IS fundamentals. Participants agreed that a distinction should be made between competencies for a beginner level and those that are more advanced. They also noted an important distinction between implementation practice, the application and adaptation of evidence-based approaches in the practice-setting, and implementation research, the rigorous study of those approaches that best enable translation of research results to real-world settings.¹⁴

The decision was made by the committee to focus on beginner-level competencies and recommend that further work be done in the future to create a more advanced version of the competency framework. This development could be done through implementation of IS training programs described in Charges 3 and 4 or through AACCP stakeholder groups such as the Social and Administrative Sciences Section. Transcripts and notes from the focus group were reviewed, summarized, and presented to the full committee for discussion. Subgroup 1 subsequently met twice to incorporate focus group feedback into the final version of the IS competency framework. The final framework consisted of 16 competencies in four domains: Fundamentals, Planning, Methods, and Dissemination. The final framework is provided in Table 1.

RECOMMENDATION 1: The Committee recommends that AACCP pursue further articulation of domains to include competencies that encompass more advanced topics in implementation science.

INCREASING CAPACITY FOR IMPLEMENTATION SCIENCE AMONG AACCP MEMBERS

In early discussions, the committee decided that the competency framework established through Charge 2 would form the basis of the micro-credentialing or badge program developed through the work on Charge 3. The committee therefore proceeded with work on Charge 4 while the competency framework was developed and refined. In consultation with President Lin, the committee decided to focus on experienced pharmacy practice faculty as the intended target of Charge 4, to pair with IS experts. Subgroup 2 of the committee was tasked with developing a detailed description of the mechanism or program structure to enact Charge 4. Training programs in IS and pharmacy-based research were assessed, and representatives from two sponsors of such programs, the National Cancer Institute (NCI) Training Institute for Dissemination and Implementation Research in Cancer (TIDIRC) and AACCP's Focused Investigator Training (FIT) and Mentored Research Investigator Training (MeRIT), were invited to separate committee meetings to share experiences and lessons learned from these successful programs. Key features relevant to program success seem to be effective motivation for both program participants and research mentors, productive participant group and participant-mentor interactions, identification of feasible participant projects and scope, and individualized learning tailored to the readiness and specific project needs of each participant. Asynchronous program components can be valuable, but should be coupled with regular synchronous, personalized components to assure impact. Engaged program management from participants selection through program completion is also crucial in helping participants to succeed.

These programs ended up being relevant for both Charges 3 and 4. Subgroup 2 met several times to work on a white paper that described in detail the program components, target audience, project scope, application process, timing, potential funding, dissemination, and measurement of program outcomes for both charges. This white paper will be shared with the Center.

In considering Charge 4, the committee identified providing appropriate incentives for IS experts to collaborate with pharmacy practitioners, who likely lack research expertise, as the primary challenge to developing the pairing mechanism. Although AACCP reported a strong desire among successful pharmacy researchers to advance pharmacy research through mentoring, mentor bandwidth is a pressing issue in all research training programs. This issue may be compounded in an interdisciplinary, practice-based setting. The committee recognizes that creating opportunities for pharmacy practice and IS experts to interact and identify shared interests and priorities is a crucial first step for integrating IS into pharmacy practice-based research. To this end, a vibrant community and culture of implementation science in pharmacy is needed. This community should expand beyond AACCP's membership to include all pharmacy faculty, other health professionals and potential research partners. It is essential that this community reflect the full diversity of pharmacy stakeholders, including patients and the larger pharmacy professions. Support for this community could include a dedicated platform for collaborations and resource sharing managed by AACCP, eg, Slack or Google workspace, Microsoft Teams.

RECOMMENDATION 2: The Committee recommends that AACP cultivate an inclusive community of interest in implementation science in pharmacy, including IS champions at pharmacy schools, to promote application of implementation science to advance pharmacy practice, including adoption of the competency framework.

The committee feels additional momentum will need to be imparted to these interactions to move them beyond information exchange into productive research collaborations. The committee considered multiple approaches that might encourage such collaborations, including mentoring, faculty scholar and/or fellowship programs that would provide IS experts the opportunity to mentor and increase the research capability of pharmacy faculty and thereby cultivate them as potential research partners. A program model focused on assisting pharmacy faculty to develop attractive practice transformation project proposals with IS experts, who would then serve as co-principal investigators in the resulting projects, was also considered. The committee sees considerable value in research and researcher development programs and believes such development will be necessary for long-term flourishing of IS research in pharmacy. However, the committee ultimately decided that the current need for near-term implementation of practice advancement projects requires creation and sustenance of interdisciplinary teams that span practice and research. These interdisciplinary teams have the potential to bridge implementation practice and research, enabling pharmacy faculty to focus their efforts on their strengths in practice competencies such as community engagement and problem identification, while their partners evaluate which practice features are essential to achieving desired outcomes, enabling migration of successful practices to new contexts.

A successful team science model centered around the strengths that pharmacy faculty bring to practice-based research would be attractive to IS experts while contributing to a legacy of capacity for IS practice and research at practice faculty's home institutions. Pharmacy practice faculty possess key skills in health care including patient care and deep knowledge of the intricacies of the healthcare system, including medication access, workflow and pricing, that often frustrate attempts to implement evidence-based practices. These skills flow from identified IS competencies in stakeholder engagement and identification of real-world problems that are included in the framework developed by this committee. Critical features of the proposed team model are the integration of students and other trainees, affiliates, community partners, other health care professionals and preceptors into the project team and institutional support for the team and project idea.

The committee recommends that AACP develop a program to support interdisciplinary team formation, partnering pharmacy practice faculty, students, and preceptors with IS experts. The aim of the program should be to build capacity for sustained practice transformation at the pharmacy practice site, which requires implementation practices such as fidelity measures and quality assurance to maintain outcomes related to the transformed practice. The pharmacy practice side brings a meaningful, viable opportunity for health outcomes improvement, while the implementation scientist brings the expertise needed to ensure fidelity, scalability, and sustainability of the transformed practice model.

The committee imagines a program in which AACP creates events or spaces in which pharmacy practice and IS experts are brought together to share their practice and research interests, with the intention of identifying matches that have the potential to blossom into productive collaborations. AACP should support pharmacy faculty with identified practice transformation projects in preparing for these events, eg, reviewing project descriptions, articulating the value of their project to potential collaborators, identifying barriers to starting the project, and outlining the "ask" of a collaborative partner. AACP should cultivate a community of experienced IS and practice experts within academic pharmacy that can assist in planning these events, helping pharmacy faculty prepare for the event and recruiting IS experts interested in collaborating in pharmacy research. This community of interest will also provide crucial links to organizations and meetings at which AACP can plan IS-pharmacy matchmaking events. AACP should continue to host or sponsor events at existing meetings, such as the annual Science of Dissemination & Implementation Conference, while also pursuing new opportunities to foster engagement between pharmacy practice and IS research, such as the new [RAPID Alliance](#).

Pairs or teams that identify possible collaborative projects at these events should be encouraged to submit a white paper to AACP on the project, including details on how the inclusion of IS will lead to sustainable, scalable practice transformation through the project. Teams will also be asked to provide evidence of support from their home institutions to provide the necessary resources to dedicate to team formation, study design and project planning. Such resources could include release time, access to relevant data sources, in-kind support, funds for study materials and services (data collection, analysis, etc.), and administrative support. Promising teams would qualify for additional support from AACP, including check-ins on milestones (related to team formation and function as well as project planning and implementation), guidance on best practices in team science, such as use of team science agreements,¹⁵ continued educational networking opportunities, identification of potential funding support, assistance with future grant development and possibly starter grant funds.

RECOMMENDATION 3: The Committee recommends that the Center develop a program to support formation of interdisciplinary research teams that pursue practice transformation projects.

AACP's support for these teams could represent an opportunity to affect transformative change in pharmacy practice, particularly related to medication optimization and among those experiencing health disparities (eg, rural communities and individuals from ethnic/racial minorities experiencing unique barriers to medication use). Given pharmacy's position as the most accessible health profession, scalable and sustainable practice transformation projects could provide important public health benefits. AACP may serve as or partner with a coordinating hub for multi-state, multi-institutional programs with high potential for attracting large cooperative funding agreements from federal agencies (eg, HRSA, NIH, FDA) to address significant unmet health needs and increase health equity. Existing AACP partnerships such as the RAPID Alliance are already leaning in this direction, and AACP should continue and deepen its efforts in this space.

RECOMMENDATION 4: The Committee recommends that AACP leverage its convening power to identify and develop flagship programs that employ IS to address unmet health needs.

While the target audience for both charges 3 and 4 are practice faculty, the focus of charge 3 is on the development of faculty into researchers capable of deploying IS in practice advancement projects, with sufficient research readiness to be able to converse, interface and collaborate with study design experts. Many programs and resources for training in IS exist already, such as the online, open-access materials provided through the NCI's Open Access TIDIRC (<https://cancercontrol.cancer.gov/is/training-education/TIDIRC-open-access>). However, pharmacy faculty seem to be reluctant to embrace these programs or pursue training in IS. This mirrors the findings of last year's committee that even within pharmacy, IS work is often led by collaborators from outside disciplines such as public health. Better systems of support for pharmacists and pharmacy faculty to engage in and complete these programs may be needed more than new programs. Additionally, suitable motivation to pursue professional development in this space may be lacking among faculty.

The committee envisioned a badge or micro-credentialing program built around available open access modules, to avoid duplication of existing resources. Additional modules would be organized along the competency framework developed by this committee, with an emphasis on applying IS principles to transform pharmacy practice. These modules may even act as a resource for pharmacy schools that wish to develop their own courses or credentialing in IS. To increase their value to pharmacy faculty and motivate participation, AACP should provide CE credit for completion of modules.

In addition to learning modules, the committee envisioned a program of facilitated and synchronous learning around IS in pharmacy, consisting of lessons and guided exercises with IS experts. The program would support independent study assignments, joint exercises with fellow program participants and a final project specific to the research interests and career development goals of individual participants. These final projects could include clinical protocols, specific aims for grant proposals, or another deliverable specific and appropriate to the interests of the participant. A common deliverable could be a project plan linked to advanced practice, with an approach that links practice to sustainability, to demonstrate comprehension of the key barriers to implementing and scaling advanced projects. AACP might consider encouraging community-engaged research by incorporating human-centered design principles for participant projects.¹⁶ Finally, program participants could prepare an individual development plan that incorporates the learnings and outcomes of the badge program into their practice and scholarship.

Dedicated effort from program facilitators in appropriate numbers to fully support each participant will be important to program success. Creation of program cohorts that form lasting connections, collaboration and relationships to support each other in their development in research and implementation practice will also be key. Learning and training in team science approaches are essential for pharmacists seeking to engage in implementation practice and research. A cohort model for the program may impart additional opportunities for development of collaborative skills while also providing peer mentoring and support for program completion. These cohorts will also feed into the community of interest in IS in pharmacy. As with the team science program envisioned for charge 4, careful program management by AACP will be needed.

RECOMMENDATION 5: The Committee recommends that through the Center, AACP recognize and reward success in application of implementation science to transform practice.

SUGGESTION 1: The Committee suggests that pharmacy schools recognize and promote interest in application of implementation science to advance practice.

In summary, the work of the 2020-2021 Research and Graduate Affairs committee resulted in the development of an implementation science competency framework and plan for badging/credentialing and mentoring programs for support practice transformation, culminating in the following recommendations and suggestions.

RECOMMENDATIONS:

1. The Committee recommends that AACP pursue further articulation of domains to include competencies that encompass more advanced topics in implementation science. (These topics, eg, sustainability, cost, de-implementation, may be good topics for inclusion in modules of a micro-credentialing or badge process in Charge 3.)
2. The Committee recommends that AACP cultivate an inclusive community of interest in implementation science in pharmacy, including IS champions at pharmacy schools, to promote adoption of the framework and application of implementation science to advance pharmacy practice. (Sections, SIGs, Connect Community to support)
3. The Committee recommends that the Center develop a program to support formation of interdisciplinary research teams that pursue practice transformation projects.
4. The Committee recommends that AACP leverage its convening power to identify and develop flagship programs that employ IS to address unmet health needs.
5. The Committee recommends that AACP and the Center recognize and reward success in application of implementation science to transform practice.

SUGGESTIONS:

1. The Committee suggests that pharmacy schools recognize and promote interest in application of implementation science to advance practice.

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Table 1. Implementation Science Competency Framework

This competency framework is intended to be used by graduate programs to supplement the competencies listed in AACP's Six Domains of Graduate Education in the Pharmaceutical Sciences.⁴ Therefore, it is assumed that basic research knowledge and skills are in place before incorporating these competencies, which are specific to Implementation Science. For purposes of this framework, the terms intervention and program may be used interchangeably.

Domain	Competencies
1. Fundamentals	<p>Explain Implementation Science (IS) terminology</p> <p>Explain rationale for implementation research</p> <p>Compare and contrast implementation science vs efficacy research and comparative effectiveness research</p>
2. Planning	<p>Identify real world problem(s) that can be addressed with implementation research</p> <p>Construct a research team with range of expertise needed to address an implementation research question</p> <p>Develop a plan to engage stakeholders throughout the implementation research process</p> <p>Articulate rationale for selecting appropriate implementation framework(s) to address an implementation research question</p> <p>Explain how to assess the need, fit, and feasibility of an intervention in a given context</p> <p>Articulate the rationale for selecting appropriate strategies to implement an intervention in a given context</p> <p>Identify financial resources to support the implementation research process</p>
3. Methods	<p>Select relevant study designs to inform appropriate implementation research question</p> <p>Identify relevant data sources to inform implementation research question and consider the practical aspects of data collection</p> <p>Identify and measure implementation and intervention outcomes relevant to stakeholders, research question, and framework</p> <p>Compare and contrast fidelity and adaptation</p>
4. Dissemination	<p>Write research papers and reports</p> <p>Disseminate study findings to appropriate stakeholders through the appropriate effective channels</p>

Appendix I. Implementation Science Draft Competency Framework

You have been identified as someone engaged in implementation research and/or with expertise in implementation science. Thank you for taking time to respond to our survey. Your input will assist us in further refinement of the draft Implementation Science (IS) Competency Framework for Graduate Education. The framework is intended to guide programs who wish to integrate IS competencies into their existing graduate program, or to assist programs that are contemplating a new IS focus. The framework is being developed by the American Association of Colleges of Pharmacy Research and Graduate Affairs Committee, with input from external stakeholders like you. We greatly appreciate any input you have that will help us improve the competency framework.

The competency framework is currently divided into 5 domains: *Planning, Study Design, Evaluation, Dissemination, and Cross-Cutting*. Several competencies are included under each domain. We are seeking input on the wording and relevance of each, as well as the overall domain structure.

Here is the draft competency framework in full: [RGAC 2020 21 implementation science competency framework draft 21 nov.](#) If possible, we recommend opening this pdf version of the competency framework in a separate window/monitor as you fill out the survey so that you may refer to the entire list as you work through the individual survey items.

Our goal is to get feedback from a broad audience. Are there other implementation researchers who might also provide feedback on the competency framework? If so, please provide his/her/their name(s), organization(s), and email address(es). Would you be interested in participating in a focus group conducted virtually in late January to provide feedback on the next iteration of the competency framework? If so, please provide your name, organization, and email address. These are competencies in the *Planning* domain. Please indicate the level of clarity and relevance for each competency. (Clarity Scale: Very clear [1], Somewhat Clear [2], Neutral [3], Somewhat unclear [4], Not at all clear [5]; Relevance Scale: Very relevant [1], Somewhat Relevant [2], Neutral [3], Somewhat irrelevant [4], Not at all relevant [5].

- Conduct literature review of research problem
- Generate testable research questions
- Create research team with experience to target problem and support solution
- Identify IS frameworks and theories that fit problem and solution
- Conduct formative evaluation of the need and potential solution to fit the target population/organization
- Select appropriate implementation strategies for implementation context

Please provide feedback on how clarity and/or relevance could be improved for any of the items in this domain.

These are competencies in the *Study Design* domain. Please indicate the level of clarity and relevance for each competency. (Clarity Scale: Very clear [1], Somewhat Clear [2], Neutral [3], Somewhat unclear [4], Not at all clear [5]; Relevance Scale: Very relevant [1], Somewhat Relevant [2], Neutral [3], Somewhat irrelevant [4], Not at all relevant [5].)

- Identify and select appropriate scientific methodological design to carry out the research model and test research questions
- Identify appropriate and valid outcomes measures of each variable
- Conduct sample size calculation
- Select appropriate analysis approach to test hypotheses and determine impact on outcomes
- Consider internal and external validity
- Develop protocol for recruitment, enrollment, intervention, data collection, evaluation

Please provide feedback on how clarity and/or relevance could be improved for any of the items in this domain.

These are competencies in the *Evaluation* domain. Please indicate the level of clarity and relevance for each competency. (Clarity Scale: Very clear [1], Somewhat Clear [2], Neutral [3], Somewhat unclear [4], Not at all clear [5]; Relevance Scale: Very relevant [1], Somewhat Relevant [2], Neutral [3], Somewhat irrelevant [4], Not at all relevant [5].)

- Describe the application and integration of mixed-method (quantitative and qualitative) approaches in IS research
- Apply common IS measures and analytic strategies relevant for your research question(s) within your model/framework
- Measure implementation and/or intervention outcomes that align with research questions

Please provide feedback on how clarity and/or relevance could be improved for any of the items in this domain.

These are competencies in the *Dissemination* domain. Please indicate the level of clarity and relevance for each competency. (Clarity Scale: Very clear [1], Somewhat Clear [2], Neutral [3], Somewhat unclear [4], Not at all clear [5]; Relevance Scale: Very relevant [1], Somewhat Relevant [2], Neutral [3], Somewhat irrelevant [4], Not at all relevant [5].)

- Write effective research reports
- Disseminate study findings to appropriate stakeholders through the appropriate channel

Please provide feedback on how clarity and/or relevance could be improved for any of the items in this domain.

These are competencies in the *Cross-cutting* domain. Please indicate the level of clarity and relevance for each competency. (Clarity Scale: Very clear [1], Somewhat Clear [2], Neutral [3], Somewhat unclear [4], Not at all clear [5]; Relevance Scale: Very relevant [1], Somewhat Relevant [2], Neutral [3], Somewhat irrelevant [4], Not at all relevant [5].)

- Explain rationale for implementation research
- Compare and contrast implementation science vs efficacy research and comparative effectiveness research
- Demonstrate critical thinking by responding effectively to unexpected problems that arise
- Apply principles for ethical conduct of human subjects research
- Demonstrate effective project management and leadership
- Identify funding agencies and develop an effective grant proposal

Please provide feedback on how clarity and/or relevance could be improved for any of the items in this domain.

Regarding the overall structure of the framework, are the competencies appropriately categorized within the domains? If not, how can this be improved?

What relevant competencies or domains are missing from the framework?

Is there any additional feedback you would like to provide on the competency framework?

- Conduct literature review of research problem
- Generate testable research questions
- Create research team with experience to target problem and support solution
- Identify IS frameworks and theories that fit problem and solution
- Conduct formative evaluation of the need and potential solution to fit the target population/organization
- Select appropriate implementation strategies for implementation context

Please provide feedback on how clarity and/or relevance could be improved for any of the items in this domain.

These are competencies in the *Study Design* domain. Please indicate the level of clarity and relevance for each competency. (Clarity Scale: Very clear [1], Somewhat Clear [2], Neutral [3], Somewhat unclear [4], Not at all clear [5]; Relevance Scale: Very relevant [1], Somewhat Relevant [2], Neutral [3], Somewhat irrelevant [4], Not at all relevant [5].)

- Identify and select appropriate scientific methodological design to carry out the research model and test research questions
- Identify appropriate and valid outcomes measures of each variable
- Conduct sample size calculation
- Select appropriate analysis approach to test hypotheses and determine impact on outcomes
- Consider internal and external validity
- Develop protocol for recruitment, enrollment, intervention, data collection, evaluation

Please provide feedback on how clarity and/or relevance could be improved for any of the items in this domain.

These are competencies in the *Evaluation* domain. Please indicate the level of clarity and relevance for each competency. (Clarity Scale: Very clear [1], Somewhat Clear [2], Neutral [3], Somewhat unclear [4], Not at all clear [5]; Relevance Scale: Very relevant [1], Somewhat Relevant [2], Neutral [3], Somewhat irrelevant [4], Not at all relevant [5].)

- Describe the application and integration of mixed-method (quantitative and qualitative) approaches in IS research
- Apply common IS measures and analytic strategies relevant for your research question(s) within your model/framework
- Measure implementation and/or intervention outcomes that align with research questions

Please provide feedback on how clarity and/or relevance could be improved for any of the items in this domain.

These are competencies in the *Dissemination* domain. Please indicate the level of clarity and relevance for each competency. (Clarity Scale: Very clear [1], Somewhat Clear [2], Neutral [3], Somewhat unclear [4], Not at all clear [5]; Relevance Scale: Very relevant [1], Somewhat Relevant [2], Neutral [3], Somewhat irrelevant [4], Not at all relevant [5].)

- Write effective research reports
- Disseminate study findings to appropriate stakeholders through the appropriate channel

Please provide feedback on how clarity and/or relevance could be improved for any of the items in this domain.

These are competencies in the *Cross-cutting* domain. Please indicate the level of clarity and relevance for each competency. (Clarity Scale: Very clear [1], Somewhat Clear [2], Neutral [3], Somewhat unclear [4], Not at all clear [5]; Relevance Scale: Very relevant [1], Somewhat Relevant [2], Neutral [3], Somewhat irrelevant [4], Not at all relevant [5].)

- Explain rationale for implementation research
- Compare and contrast implementation science vs efficacy research and comparative effectiveness research
- Demonstrate critical thinking by responding effectively to unexpected problems that arise
- Apply principles for ethical conduct of human subjects research
- Demonstrate effective project management and leadership
- Identify funding agencies and develop an effective grant proposal

Please provide feedback on how clarity and/or relevance could be improved for any of the items in this domain.

Regarding the overall structure of the framework, are the competencies appropriately categorized within the domains? If not, how can this be improved?

What relevant competencies or domains are missing from the framework?

Is there any additional feedback you would like to provide on the competency framework?

Appendix II. Survey Feedback on Clarity and Relevance of Competencies in each Domain

		Clarity ^a		Relevance ^b	
		Mean	SD	Mean	SD
Planning	Conduct literature review of research problem	1.40	0.66	1.60	1.02
	Generate testable research questions	1.50	0.67	1.40	0.66
	Create research team with experience to target problem and support solution	1.90	0.54	1.70	0.90
	Identify IS frameworks and theories that fit problem and solution	1.50	0.50	1.20	0.40
	Conduct formative evaluation of the need and potential solution to fit the target population/organization	1.80	1.17	1.10	0.30
	Select appropriate implementation strategies for implementation context	1.90	1.04	1.60	0.80
Study Design	Identify and select appropriate scientific methodological design to carry out the research model and test research questions	1.50	0.67	1.30	0.64
	Identify appropriate and valid outcomes measures of each variable	1.60	0.92	1.40	0.66
	Conduct sample size calculation	1.30	0.46	1.80	0.98
	Select appropriate analysis approach to test hypotheses and determine impact on outcomes	1.70	0.90	1.60	0.80
	Consider internal and external validity	2.00	1.18	1.60	0.80
	Develop protocol for recruitment, enrollment, intervention, data collection, evaluation	1.70	1.27	1.50	1.02
Evaluation	Describe the application and integration of mixed-method (quantitative and qualitative) approaches in IS research	1.60	0.92	1.20	0.40
	Apply common IS measures and analytic strategies relevant for your research question(s) within your model/framework	2.30	1.19	1.50	0.50
	Measure implementation and/or intervention outcomes that align with research questions	1.40	0.66	1.00	0.00
Dissemination	Write effective research reports	2.00	1.18	1.50	1.02
	Disseminate study findings to appropriate stakeholders through the appropriate channel	1.30	0.46	1.10	0.30
Cross-Cutting	Explain rationale for implementation research	1.40	0.92	1.30	0.46
	Compare and contrast implementation science vs efficacy research and comparative effectiveness research	1.50	0.67	1.30	0.46
	Demonstrate critical thinking by responding effectively to unexpected problems that arise	1.90	0.70	2.10	1.22
	Apply principles for ethical conduct of human subjects research	1.20	0.40	1.70	1.27
	Demonstrate effective project management and leadership	1.60	0.92	1.70	1.27
	Identify funding agencies and develop an effective grant proposal	1.20	0.40	1.50	0.81

^a1=very clear; 2=somewhat clear; 3=neutral; 4=somewhat unclear; 5=not at all clear

^b1=very relevant; 2=somewhat relevant; 3=neutral; 4=somewhat irrelevant; 5=not at all relevant

Appendix III. RGAC 2020-2021 Graduate Education Competency Framework for Implementation Science Semi-Structured Focus Group Guide

January 27, 2021

Welcome (5-10 mins; 7:00 – 7:10 am PST)

- Participant login to Zoom
- Quick introduction of committee members on call by facilitator
- Quick introduction of participants [name, institution]
- Obtain permission to record discussion

Background (10 mins; 7:10 – 7:20 am PST)

- Committee charges and intent of framework
- Process used and revisions made based on survey results [provide updated framework and reorient to framework]
- Goal of today’s focus group

Questions

[Facilitator]: I’d like to start with some big picture questions to gather your feedback on the competency framework overall...

1. Specificity of Framework (10 mins; 7:20 – 7:30 am PST)

The committee was tasked with developing a competency framework for graduate education and training in implementation science. We received feedback on the survey from respondents to make the framework more specific to implementation science.

What are the advantages and disadvantages of structuring the framework broadly to incorporate all research skills including those specific to implementation science versus focusing the framework solely on implementation science specific skills?

Probes:

- Which do you prefer – more broad or more specific? What makes you prefer this approach?
- Which approach would be most useful to you as someone who provides graduate education training in implementation science?

2. Overall Framework Structure (10 mins; 7:30 – 7:40 am PST)

What are your thoughts on the overall structure of competency framework, including the five domains of planning, study design, evaluation, dissemination, and cross-cutting?

Probes:

- What domains should be renamed, if any? What name(s) do you suggest?
- What domains should be combined, if any?
- What domains are missing, if any? What name(s) do you suggest?
- Is the order of domains important? If so, what order do you suggest?
- Is the order of competencies within each domain important? If so, what order do you suggest?

[Facilitator]: Let’s now transition and get more into the details of the framework, starting with the planning domain...

3. Planning Domain (10 mins 7:40 – 7:50 am PST)

General Questions:

- What changes should be made to the competencies in this domain?
- How can the competencies in this domain be made more specific to implementation science?
- How can we make these more useful to you as someone who provides [or interested/planning to provide] graduate education training in implementation science?

Domain Specific Questions:

- Should examples of IS frameworks, theories, and models be included?

4. Study Design Domain (10 mins; 7:50 – 8:00 am PST)

General Questions:

- What changes should be made to the competencies in this domain?
- How can the competencies in this domain be made more specific to implementation science?
- How can we make these more useful to you as someone who provides graduate education training in implementation science?

Domain Specific Questions:

- The phrase, “. . . approach to test hypotheses and determine impact on outcomes” was removed from the competency, “Select appropriate analysis.” Is this revised wording more clear or is additional detail needed?
- Is more clarity needed for the competency, “Consider internal and external validity”?

5. **Evaluation Domain** (5 mins; 8:00 – 8:05 am PST)

General Questions:

- What changes should be made to the competencies in this domain?
- How can the competencies in this domain be made more specific to implementation science?
- How can we make these more useful to you as someone who provides graduate education training in implementation science?

Domain Specific Questions:

- For the competency about measuring outcomes, examples are listed in the right hand column in the framework. Should some of these outcomes be pulled out as separate competencies?

6. **Dissemination Domain** (5 mins; 8:05 – 8:10 am PST)

General Questions:

- What changes should be made to the competencies in this domain?
- How can the competencies in this domain be made more specific to implementation science?
- How can we make these more useful to you as someone who provides graduate education training in implementation science?

Domain Specific Questions:

- [none]

7. **Cross-Cutting Domain** (10 mins; 8:10 – 8:20 am PST)

General Questions:

- What changes should be made to the competencies in this domain?
- How can the competencies in this domain be made more specific to implementation science?
- How can we make these more useful to you as someone who provides graduate education training in implementation science?

Domain Specific Questions:

- Should competencies in this domain be folded into the other domains or left separately?
- A competency about identifying and engaging with stakeholder was added to this domain. Do you think it is clear and relevant?
- Should the competency about IRB be made more comprehensive by including regulatory bodies outside the US, such as HREC and RECs?
- Should examples of “unexpected problems” be included?
- Is there a better verb than “demonstrate”?

8. **Wrap Up and Class** (10 mins; 8:20 – 8:30 am PST)

What final feedback do you have on the competency framework that we have not yet addressed?