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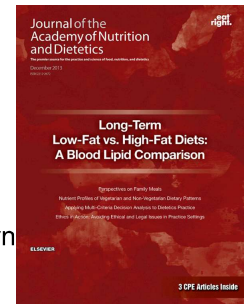

Considerations for Incorporating Implementation Science into Dietetics Education

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Considerations for Incorporating Implementation Science into Dietetics Education

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Considerations for Incorporating Implementation Science into Dietetics Education

Often, health professions faculty and preceptors, including those in dietetics, are not trained how to teach. Rather, they learn from self-study, colleagues, and their own past experiences in the classroom. While evidence-based teaching strategies exist, there is often little information available on how to implement those strategies in a classroom and how they may be adapted to a particular context.[1]

As an evidence-based profession, it is imperative that dietetics educators use evidence-based teaching and training strategies, not only in the classroom but in the design and administration of the variety of dietetics program types now available. Still, information on how to implement something as small as an individual teaching strategy or as large as a particular program type is lacking in the dietetics higher education literature. Implementation science (IS) is the study of the process of implementation, implementation outcomes and their predictors, and strategies to promote effective implementation of evidence-based practices.[2] The field of IS is dedicated to answering the question, "How do I implement a particular evidence-based item (intervention, program, teaching strategy, etc.)?" As new program types emerge in dietetics education, like Future Education Model (FEM) Associate Degree Programs (APs), Bachelor Degree Programs (BPs), and Graduate Degree Programs (GPs),[3] it is imperative that program directors know how to implement these programs as intended in order to achieve the student outcomes desired. Furthermore, use of IS in education of other health professions is emerging as best practice. The National Academies of Sciences, Engineering, and Medicine Global Forum on Innovations in Health Professional Education devoted an entire workshop to exploring the use and application of IS in health professions education, in fact.[4, 5] While dietetics representatives were invited to contribute to this workshop, examples of IS in dietetics higher education were limited. As other health professions begin to utilize IS in their education programs, translation of evidence-based strategies into their teaching and program administration will occur more rapidly. Lagging behind in this IS initiative could eventually compromise the evidence base of dietetics education. In order to achieve and maintain its position as a valued member of the interprofessional team, it is critical that dietetics follow suit in this endeavor to elevate health professions education, including dietetics. Thus, the aim of this article is to provide readers with tangible tools to document and report implementation of evidence-based strategies in their dietetics classrooms and programs.

What Is Implementation Science?

The field of IS is relatively new, particularly within higher education and dietetics education.[2] However, a variety of theories, models, and frameworks[6] exist to guide researchers, practitioners, and instructors in considering the three primary aspects of implementation to study or simply consider in their teaching and program administration:

1) *implementation context* (where the intervention is implemented, e.g., large public university, small private college, large city with many facilities for student practicum/supervised practice placement, small city with few facilities for student experiential learning), and the barriers and facilitators (*determinants*) to implementation that the context presents;

2) *implementation outcomes* (reach, feasibility, sustainability, cost, and other characteristics of the program itself); and
3) *implementation strategies* (actions taken by colleges/universities, program directors, or instructors to improve implementation outcomes).[2]

Determinant frameworks, such as the Consolidated Framework of Implementation Research (CFIR), guide the study of implementation contexts, allowing for identification of barriers to and facilitators of implementation affecting implementation outcomes.[2, 7] Evaluation frameworks, such as the RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) framework, guide the study of implementation outcomes (feasibility and sustainability of a program model, for example) along with the more traditional student outcomes of interest, such as student acceptance rates into dietetic internships, student pass rates on the Commission on Dietetic Registration (CDR) exam, and student employment rates post-graduation.[2, 8] Implementation strategies encompass a wide variety of approaches targeted at different "stakeholders" within program implementation, from the student to the instructor, program director, and even college/university administration.[2, 9, 10]

How Is Implementation Science Currently Used in Dietetics?

To move evidence-based nutrition guidelines into dietetics practice. Much of the current IS work in the dietetics field is focused on nutrition and health education for the public.[2] For example, large IS studies have evaluated implementation of the MOVE Weight Management Program implemented in Veterans' Affairs hospitals, as well as CDC's National Diabetes Prevention Program lifestyle change program.[11-15] These studies used standardized tools/frameworks (many of which are discussed in later sections of this article) to document how they implemented their programs, barriers they encountered and supports they received during implementation, and how they overcame those barriers and capitalized on those supports.[11-15] Outcomes reported included how the researchers measured fidelity of implementation to the program protocol, any adaptations they had to make, degree of uptake of the program by all those eligible to implement it, and how many people were reached by the program compared to the number of eligible participants.[11-15]

Several articles have been published in recent years introducing ways to use IS to advance use of evidence-based nutrition guidelines in nutrition practice. In 2019, Tumilowicz et al. presented IS frameworks that may be used to address implementation questions in regard to nutrition practices and interventions, as well as several examples of how these have been used to address malnutrition across the globe.[16] In 2021, Murofushi et al. and Young et al. further detailed IS frameworks that registered dietitian nutritionists (RDNs) can use to incorporate evidence-based guidelines into their practice.[17, 18]

In addition to these foundational papers, the Society for Implementation Science in Nutrition (SISN) was created in 2016 with funding from the Bill and Melinda Gates foundation to provide IS resources to members of the nutrition community, specifically to support implementation of a program targeting anemia in women in Uganda and Kenya.[19] From this beginning, SISN now offers an IS system toolkit for nutrition educators and researchers new to IS, webinars that provide examples of incorporating IS into nutrition practice and education, and connection to

events hosted by other IS organizations, like the Society for Implementation Science Research Collaboration.[19]

To move evidence-based teaching strategies into dietetics higher education. Furthermore, IS is gaining traction in higher education to advance use of evidence-based teaching strategies; and resources have been published to provide educators and researchers with key IS frameworks and tools to conduct this work in their unique setting.[1] However, use of IS in dietetics higher education and training of future RDNs is limited. While IS components are often incorporated into dietetics teaching and program administration, there is a general lack of consistency in the tools/frameworks used to document and report IS components, leading to challenges in generalizing findings and reproducing methods.[1]

This lack of consistency in IS reporting tools and platforms is major barrier to continued and increased use of IS in dietetics education.[1] In addition, large-scale IS studies can be labor-intensive, presenting a barrier to settings with limited personnel resources. The aim of the following sections is to help readers overcome these common barriers to incorporating IS into their dietetics education programs and ultimately move forward the IS initiative in dietetics education.

Opportunities to Incorporate Implementation Science into Dietetics Education

IS can and should be utilized across all areas of dietetics education and training. Examples of ways to incorporate IS into teaching or program administration are provided below. While programs may already incorporate some or all of the evidence-based strategies discussed in the following sections, standardized documentation of the implementation process and outcomes is imperative to guide future implementation, particularly in new programs and program types like FEM programs.

Didactic Setting

In the didactic setting, as in other traditional higher education settings, IS can help instructors integrate evidence-based teaching and pedagogical strategies into their classrooms.[4, 5] Table 1 below provides examples of evidence-based teaching strategies that could be used to meet Accreditation Council for Education in Nutrition and Dietetics (ACEND) Knowledge Requirements for RDNs (KRDNs), and how IS could be used to implement these strategies.

In their publication on adapting IS for higher education, Soicher et al.[1] provide a useful adaptation of a CONSORT diagram that reports components of the RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance) framework developed by Glasgow et al. to standardize reporting of the implementation process, as well as key implementation outcomes of interest.[20, 21] In this adapted CONSORT diagram, educators and researchers are prompted to report the number of students *reached* by an evidence-based teaching strategy compared to the number of eligible students. For example, a university may offer the same class in a flipped classroom format and a traditional format. Students may be informed of the different classroom formats prior to registration, and educators could compare the number of students that register for the flipped classroom versus the traditional format. Similarly, a university may

document the number of faculty who chose to *adopt* and *maintain* an evidence-based teaching strategy, compared to the number of "eligible" faculty who chose not to adopt and/or maintain that strategy. Students' grades in the flipped versus traditional classroom formats could be compared to evaluate the *effectiveness* of the flipped classroom strategy, along with reports of student (and instructor) satisfaction with the strategy. Lastly, the RE-AIM framework can guide documentation of the implementation process, with a focus on fidelity of *implementation* per protocol, as well as documentation of any adaptations/deviations from the protocol.

Table 1 Implementation Science Examples for the Didactic Dietetics Setting

2022 KRDN	Evidence-based Teaching Strategy	Implementation Science Factor		
		Determinants	**Strategies**	**Outcomes**
Domain 1 (KRDNs 1.1-1.3): Integration of scientific information and research into practice	Flipped Classrooms[22]	• Instructor time to re-design course to flipped format • Student engagement with flipped format (time spent on readings/activities out of class and engagement in in-class discussion) • Class size	• Collaboration with instructional designer to assist with course re-design[22] • In-class activities' dependence on out-of-class work[22] • Utilization of teaching assistants to assist with large classes[22]	• Student and instructor satisfaction with course • Student learning outcomes (exam/quiz/project grades, critical thinking) • Instructor's perceived feasibility and sustainability • Future course enrollment

Domain 3 (KRDN 3.1): Development and delivery of information, products and services	Case Studies[23]	• Funds to purchase case study texts or instructor experience to create original, up-to-date case studies
		• Class size
			• Collaboration with practicing RDNs to create original case studies
			• Utilization of teaching assistants to assist with grading in large classes
				• Student satisfaction with case study assignments
				• Student learning outcomes
				  ○ Case study grade
				  ○ Preceptor/employer feedback on student preparedness
				• Instructor's perceived feasibility and sustainability

Domain 3 (KRDNs 3.3-3.4)	Mock/Simulation Exercises[23]	• Equipment/actors needed for simulation • Instructor time to develop cases/scenarios • Instructor time/expertise for	• Equipment grants • Collaboration with nursing/exercise science/theater departments	• Student satisfaction with exercises • Student self-efficacy/confidence • Student learning outcomes ○ Performance on exercise

		case/scenario debrief		○ Preceptor/employer feedback on student preparedness • Feasibility and sustainability of grants and collaborations
All Domains/ Application-focused KRDNs	Experiential Learning[23, 24]	• Clinical/community/ food service/ management sites/ preceptors/mentors available • Other colleges/ universities utilizing same sites	• Establishment of strong community collaborations • Designated faculty or faculty load for establishing and maintaining community relations (e.g., program coordinator) • Utilization of telehealth/remote work	• Reach of experiential learning opportunities (% of students able to place in sites, % of available sites taking students) • Student learning outcomes ○ Performance in experiential learning practicum ○ Preceptor/mentor feedback on student growth during practicum

Supervised Practice Setting

In addition to the traditional didactic classroom setting, IS is arguably even more important to incorporate in the development and administration of supervised practice programs, whether they be on-site internships alone, distance internships alone, coordinated undergraduate degree/internship programs, or combined internship/graduate degree programs.

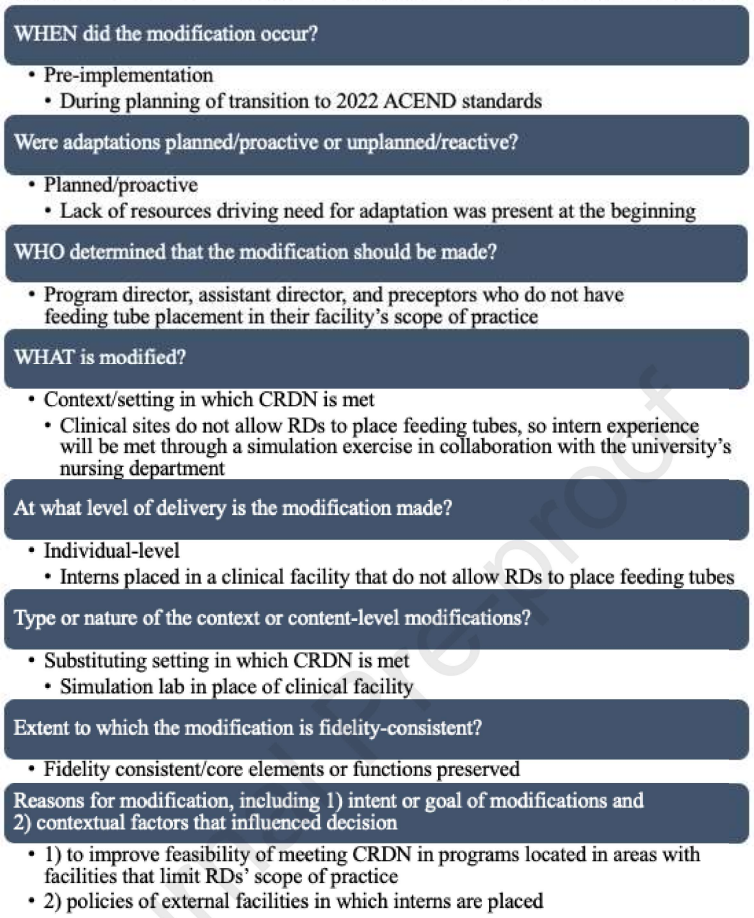
A major focus of IS is studying how to implement the core components of an intervention/program as they were intended to be implemented in order to get the desired outcomes observed in prior efficacy and effectiveness research.[25] This focus aligns with the design and evaluation of supervised practice dietetic internship programs set by ACEND. Dietetic internships are based on core competencies (CRDNs) that interns must meet in order to be prepared for a position as an entry-level RDN. Still, the contexts in which dietetic interns develop competence in these areas varies widely, while the need to successfully meet these competencies remains. IS is poised to bridge this gap between varied contexts and necessary outcomes, as it can guide the implementation of dietetic internship programs by program directors and other faculty/staff/preceptors.

Many dietetic internship programs include projects that, when completed by the dietetic intern, will exhibit their competence in the CRDNs that project is designed to meet. These projects facilitate experiences that meet the required CRDNs across a variety of contexts. Naturally, the experiences and projects through which an intern develops competence in a required area will differ from one intern to the next. IS is helpful in these cases, as frameworks exist to guide systematic program adaptations to ensure that fidelity to the core components of the program remain, while guiding future program implementation. Documenting these program adaptations is imperative and a central value of IS, as researchers and educators cannot assume that after adapting an evidence-based intervention, program, or teaching strategy, that it will produce the same outcomes. Systematically documenting adaptations through frameworks such as the one presented below can guide interpretation of outcomes when a particular adaptation has been made.

An example of a framework that can guide documentation of program adaptations is FRAME (Framework for Reporting Adaptations and Modifications-Enhanced).[26] Even small evaluations of implementation of supervised practice programs, and documentation of adaptations made using frameworks such as FRAME, can be instrumental to maintaining and advancing the quality of supervised practice programs across the U.S.

For example, the new 2022 CRDN 3.5 statement requires dietetic interns to "Explain the steps involved and observe the placement of nasogastric or nasoenteric feeding tubes; if available, assist in the process of placing nasogastric or nasoenteric feeding tubes." However, depending on the size of the clinical setting and its scope, including RDN scope, in which a dietetic intern completes their clinical rotation(s), this opportunity may not be available. Thus, programs may have to make adaptations to how interns will gain this experience, such as a collaboration with campus nursing departments to complete a nasogastric tube placement simulation. Program directors can easily document this adaptation using the FRAME framework, consistent with documentation in other health professions and as seen in Figure 1 below.[27]

Figure 1 FRAME documentation of CRDN 3.5 implementation



Future Education Model

A major topic of discussion in dietetics education is the new Future Education Model (FEM), with numerous demonstration programs now operating to determine the effectiveness of the model for future dietetics education. While effectiveness of FEM programs is still to be fully determined following implementation of the current demonstration programs, it is imperative that implementation of these programs also be evaluated in addition to their effectiveness. If demonstration program outcomes are positive and ACEND decides to transition accredited programs to FEM APs, BPs and GPs in the future, education and training of future RDNs will suffer without proper guidance and "lessons learned" from implementation of current demonstration programs.

A variety of IS frameworks would be appropriate to use to evaluate implementation of FEM demonstration programs. One of the more commonly used frameworks, especially in evaluation of higher education programs, is the Consolidated Framework for Implementation Research (CFIR).[1, 7] The CFIR is a helpful framework for identifying barriers to and facilitators of implementation and implementation outcomes, which can inform the development of strategies to improve future implementation of the program of interest. Implementation barriers and facilitators can be identified through documentation by the program director and other program

administrative faculty/staff, as well as through interviews, focus groups, and/or surveys with program stakeholders (faculty, preceptors, students, college/university administration). A variety of tools to make use of the CFIR easier are available on the CFIR website.[28] An example of how the CFIR might be used to identify implementations barriers to and facilitators of meeting FEM GP unit 3, competency assessment 3.4, "Applies and demonstrates an understanding of agricultural practices and processes (Show)," is presented in Figure 2 below.

Figure 2 CFIR determinants of FEM GP unit 3, competency assessment 3.4

Evaluation of implementation with frameworks like the CFIR can be conducted alongside effectiveness evaluations through hybrid effectiveness-implementation trials.[29] These hybrid designs are encouraged in many instances, as they minimize the research-to-practice (or, in the case of dietetics education programs, research-to-education) gap and promote more rapid, effective implementation of evidence-based approaches.

Call to Action

For dietetics educators new to IS, incorporating IS into their teaching and program administration may not seem feasible. However, because of the evidence supporting the value of IS for maximizing effectiveness of dietetics teaching and practice, overcoming barriers to use of IS is imperative.[30, 31] It is likely that many are already incorporating informal pieces of IS into their teaching and program evaluation. Actions as simple as surveying students after implementation of a new teaching strategy or asking preceptors simple interview questions during site visits can provide valuable feedback on how to improve implementation. The Nutrition Educators for Health Professionals (NEHP) and Nutrition and Dietetic Educators and Preceptors (NDEP) Dietetic Practice Groups offer numerous platforms to share the results of IS factors like these in order to advance dietetics education as a whole. Furthermore, publication of IS research in dietetics journals will play a key role in closing the knowledge gap on incorporating IS into dietetics education.

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		Implementation Science Factor		
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Domain 3 (KRDN 3.1): Development and delivery of information, products and services	Case Studies[21]	• Funds to purchase case study texts or instructor experience to create original, up-to-date case studies
		• Class size
			• Collaboration with practicing RDNs to create original case studies
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				  ○ Case study grade
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Domain 3 (KRDNs 3.3-3.4)	Mock/Simulation Exercises[21]	• Equipment/actors needed for simulation • Instructor time to develop cases/scenarios	• Equipment grants • Collaboration with nursing/exercise science/theater departments	• Student satisfaction with exercises • Student self-efficacy/confidence • Student learning outcomes ○ Performance on exercise

		• Instructor time/expertise for case/scenario debrief		○ Preceptor/employer feedback on student preparedness • Feasibility and sustainability of grants and collaborations
All Domains/ Application-focused KRDNs	Experiential Learning[21, 22]	• Clinical/community/ food service/ management sites/ preceptors/mentors available • Other colleges/ universities utilizing same sites	• Establishment of strong community collaborations • Designated faculty or faculty load for establishing and maintaining community relations (e.g.,	• Reach of experiential learning opportunities (% of students able to place in sites, % of available sites taking students) • Student learning outcomes ○ Performance in experiential learning practicum

		program coordinator) • Utilization of telehealth/remote work	○ Preceptor/mentor feedback on student growth during practicum

Figure 1 FRAME documentation of CRDN 3.5 implementation

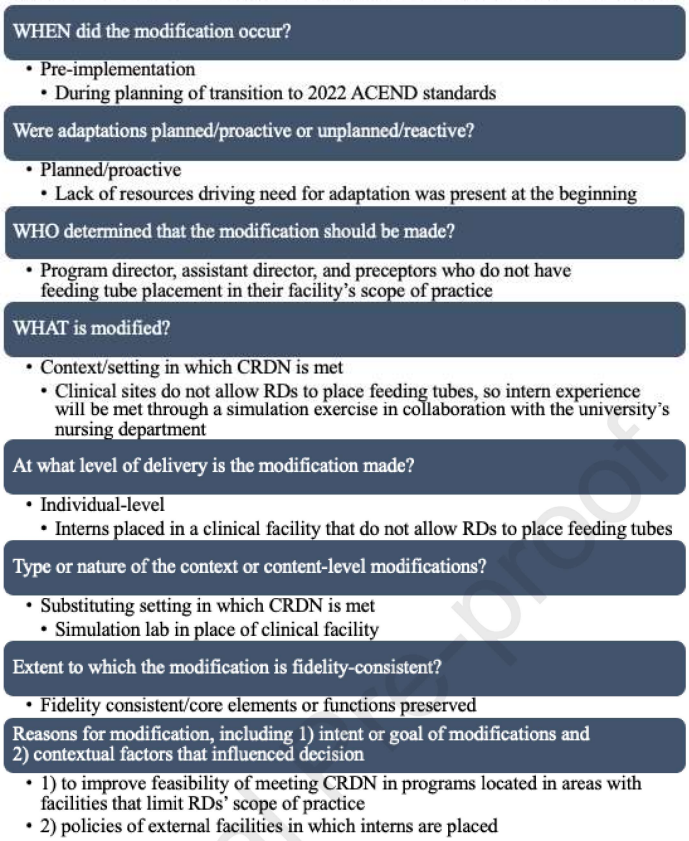

Figure 2 CFIR determinants of FEM GP unit 3, competency assessment 3.4