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# A Framework for Thinking About Transferring Teaching Innovations into New Settings

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## Abstract

As a result of health science educators' shift to more active formats of teaching and learning, many educators are implementing innovative teaching strategies that were designed in other educational contexts. In some cases, this transfer from one context to another is smooth and unproblematic, but in others, educators must make informed decisions about how to adjust the innovation or incoming context to fit their needs. This paper presents a framework that draws on principles of design-based research to guide educators in analyzing and adapting teaching tools to fit new contexts.

## Introduction

In recent years, the health sciences have reframed education as a dynamic interplay among students, educators, content, and context.[1] With this shift, many educators have reached for innovative tools to improve student engagement and deep processing of material.[2] At the same time, many have experienced that the tools fail to perform as initially described or to deliver on their intended promise. Reason for these failures points to educators' understanding of instructional design and how to integrate new teaching tools in a meaningful way.[3] This finding suggests the need for more resources and pedagogical support to guide educators' decision-making around the implementation of learning tools into their teaching environment.

In this article, we offer educators a practical guide for thinking about how to implement new teaching tools into their teaching and learning context through a process known as design-based research (DBR). DBR provides educators with an analytical process in which educators examine aspects of their educational innovation (i.e. clickers, flipped classrooms, etc.) to understand how they operate and behave within a specific setting. DBR has its roots in instructional design,[4] which is concerned with the design of tools and their behavior from their initial conception to evaluation. By Employing DBR, faculty can move beyond determining *if* an educational design "worked" or produced the desired learning outcomes to focus on examining *how* and *why* a design works in a specific context.[5]

In this paper, we expand the initial work published by Collins, Joseph, and Bielaczyz[6] to provide a flexible yet systematic methodology to identify the hidden elements of teaching implicit in any practice. In the following sections, we begin with a brief overview of two common perspectives on implementation, fidelity of implementation and mutual adaptation, and discuss when and why an educator would prefer one approach over another. We then introduce a

framework grounded in DBR as a cognitive structure to guide faculty members' thinking throughout the implementation process. Given that pedagogy should be the focal point of any educational process, the DBR framework is applicable to both in person and online learning environments.[7]

**Issues in Implementation: Fidelity or Mutual Adaption?**

Fidelity of implementation and mutual adaptation are considered polarized perspectives on how best to approach the implementation of innovations.[8] Health professions educators may have encountered the *fidelity of implementation* approach within the workplace because it is a familiar construct in both the clinical and basic sciences. This approach underscores the importance of implementing or delivering an innovation as prescribed regardless of the human, structural and physical features in the new setting. It assumes that innovations should be implemented *as is*, and any mutations made to the innovation are viewed as potentially compromising both the integrity and effectiveness of the effort.[9] However, unlike clinical settings, educational settings have unique features that constrain or facilitate learning, such as the background of students and time spent on content. In such cases, educators must make adjustments and adaptations to their teaching when innovative tools are transferred from one setting to another.[10] This process of adapting an innovation to suit the new environment is known as *mutual adaptation* and is at the core the of DBR process. Mutual adaptation acknowledges that the effectiveness of an innovation is contextually dependent and requires educators to attend to how the design functions within a new setting.[11]

## Design Based Research as a Framework for Implementation

Grounded in the contemporary view that educational design is a complex system of elements including teachers, learners, their tasks, and the environment,[12] DBR is a process that examines each element of an innovation in an effort to decide what aspects need to be modified.[11,5] DBR is flexible in terms of where educators begin the analytical process, yet is highly structured in terms of the kinds of questions educators must ask themselves. Our framework draws from activity setting analysis[13] and is shaped around six primary questions the educator should ask about the educational innovation: What, who, when, where, why, and how. Addressing these questions enables the educator to examine the design's core elements and then implement the innovation in a way that responds to all aspects of the new context.[14] This level of analysis helps educators implement the innovation to meet the educator's intended learning goals.[15-17] Figure 1 provides a visualization of an overview of the kinds of questions that need to be addressed as educators prepare their teaching contexts and tools for implementation into a new setting.

To provide a concrete picture of how to use the DBR framework, we draw on McLaughlin et al's (2014) work that describes how a traditional lecture-based classroom was transformed into a flipped classroom.[18] We use McLaughlin et al's work to illustrate how an educator could use the DBR process to help with the implementation of any tool (educational strategy, method, or technology) into a new setting. McLaughlin's et al's account is useful in this regard because it provides a rich description of the original classroom, modifications made to create a flipped classroom, and other important details educators should consider as they implement new tools into their settings. The following sections provide a step-by-step description of the DBR framework applying it to McLaughlin et al's study where applicable.

Although educators can start the mutual adaptation process with any of the core design elements, we began with addressing the question of *why. That is to say, why use this innovation?*

**The Why: Why Use This Innovation?**

Beginning the DBR process by addressing the question of *why* ensures educators consider the goal they are trying to achieve. To begin the analytical process, discern the original goal of the tool as a means for understanding how your goals compare to those of the original design.[19] If the goals are different, consider what modifications need to be made or whether a different innovation might better suit students' instructional needs. For example, in McLaughlin et al's work, their goals were to develop students as critical thinkers and problem solvers, engage students and instructors in the learning process, and stimulate higher order thinking. The instructors switched their lecture-based teaching so that students watched online lectures prior to coming to class and then used classroom time for problem-based and inquiry oriented activities. In this case, the instructors were trying to increase student engagement, problem-solving ability, and collaboration among students, which may be similar to others who are implementing flipped classroom designs.

Once you have identified the goals, consider the types of assessments needed to evaluate student progress towards these goals.[20] Types of assessment are not always included in articles that describe the development or implementation of new teaching tools. In the case of McLaughlin et al.'s classroom revision, the instructors used a combination of student response device quizzes, pair share problem-solving, student presentations and discussion, as well as, individual and paired quizzes. They clearly articulated how assessment was included in the revision of the course. If the goals and assessments for a teaching innovation are not clearly articulated or aligned with the teaching strategies, a backwards design approach [21] might be

useful. In backwards design, the goals and assessment methods are first identified because they inform instructional practices.[22] For example, if critical thinking is key, then assessment should include items that require critical problem solving, not the replication of facts.[5]

**The What: What are the Design Elements?**

Given that every innovative teaching tool includes various components, educators must analyze the "what" of the new innovation to know how to structure teaching in the new setting.[19] These design elements can be described as: a) the learning task: What is to be learned? b) the learning activities: What will the students do?, c) the resources used: What is needed for the activities?, and d) the types of feedback for learners: How will students know they are making progress? In the McLaughlin et al article, the authors included five learning activities as part of their revised course. The first activity included students engaging in pre-readings and viewing recorded lecture videos in an effort to develop an understanding of basic concepts. Then, once students were in class, they engaged in pair/share activities that included discussing questions in groups, writing responses on discussion boards, and designing and moderating class discussions. Each of these assessments presented opportunities for students to engage deeply with the content and their peers. As an instructor, these assessments are useful to ensure you are meeting the learning goals. Then, after students had an opportunity to share their thoughts in small groups, they presented their interpretation and summary of the class readings and participated in whole class plenaries and micro-lectures. These later activities were intentionally used to redirect learning, as well as provide focus and clarity if students seemed off track. Feedback included forms that were immediate, such as clarification from answers provided by the audience response activities and student discussions, and delayed feedback, such as when

students presented their work. Table 1 in Appendix A can be used to examine the alignment of the design elements, their purpose and the intended assessments.

## Analysis of Context: Who, When, Where?

In many articles where educators look for inspiration, it is easy to discern the "what" and "why" of an innovation. The more difficult aspect is analyzing the original and intended context, which includes the *who*, *when*, and *where* of an activity. Contexts can be thought of as "settings," which educationally can be conceived as the environment in which students are taught,[23,24] as well as the current knowledge of the learner.[25] The role of context in medical education has not been properly foregrounded in much of the published literature; however, there is a national and international call to include more contextual description around innovations in an attempt to assist educators elsewhere with making decisions on whether and how to implement new techniques in their own setting.[26] The following sections describe the importance of considering the people present with both contexts, the timing of the innovation, and the physical setting.

### The Who: Who Was the Innovation Designed For?

Knowing who the innovation was initially designed for and how this group compares with your learners is an important consideration in the implementation process. In some cases, a new population may not make too big of a difference, but in others, the innovation may need to be adjusted. For example, ask yourself about the level of understanding (i.e. knowledge and practices) of the learners in the original innovation and how it compares with your students.[27] What potential background knowledge or experiences did the learners have outside of the classroom and how does that compare to your students? Differences in levels of disciplinary

knowledge or outside experiences will impact the types of adaptations educators will need to make in order for the innovation to be most effective in their classrooms.

In the McLaughlin et al article, the authors implemented a teaching innovation typically used in higher education classes into a first-year pharmacology course with 140 students. The authors did not mention whether the number of students present would make a difference, but might be important when moving between other populations. For example, if an innovation was originally piloted in a residency setting and you want to bring it to first-year medical students, modifications to the implementation process might be considered. Perhaps you must consider the timing of when the innovation is introduced or the length of time students need to become familiar with the technology. Regardless, the similarity and differences in characteristics between populations in both settings must be well considered.

Additionally, beyond the individual students, the classroom or program culture will also impact the effectiveness of an innovation[27,20] due to potential influences on students' levels of motivation and approaches to learning.[28] Consider the nature and social context of learners and how this might impact the teaching and learning environment. In the McLaughlin et al study, attendance was recommended but not required for students. Such an attendance policy may not be acceptable in your setting, but there are other considerations that might affect implementation. Regardless, it is important to consider what effect your program culture may have on the implementation process.

Finally, who the teacher is should be considered.[29] The teacher's level of content and pedagogical knowledge has the ability to impact educational design, [30] and as such, differences in the educators' backgrounds may require adaptation. For example, if the original innovation was implemented by basic scientists, but will be implemented by a clinician, you may

want to consider what effect having a different professional backgrounds may have. Table 2 in Appendix A provides a structure for outlining a contextual analysis.

**The When: When was the Original Innovation Implemented?**

In terms of "when" an innovation is implemented into the new educational context, consider the sequencing of the curriculum.[19] Program structure and curricula vary greatly across health sciences programs,[31] and therefore educators should carefully examine where in the curriculum the innovation was initially implemented. The timing and sequencing must be taken into account when introducing a new educational design because it has potential to impact the students' background knowledge and experiences. Implementation at a different time point in the curriculum will require adaptation of the design to meet the needs of the current students. In the McLaughlin article, the authors indicate the course was offered in the second term of the first year pharmacy program, after students had participated in a course that covered physiochemical principles of drugs. In other words, the program had already laid some foundational knowledge for students before presenting new information in an innovative manner. This may be an important point to consider in the implementation of the innovation into your setting.

**The Where: Where was the Original Innovation Implemented?**

The physical and contextual setting of classrooms may also influence implementation because classroom structure has the potential to influence learning. If the learning goals involve students' active construction of knowledge, then a large lecture room, where students are spread out, may not be the most effective setting. Intimate learning may not be possible when students cannot easily turn to each other and form small groups. In some cases, the contexts extend beyond the physical setting to the culture of the classroom and program,[19] and therefore,

educators should question how learning is approached,[28] and how knowledge is conceptualized [32,33] and consider its influence on learning. For example, if knowledge conceptualized as factual information that the instructor delivers to the student, large lecture halls might be acceptable. However, if knowledge is conceptualized as a dynamic concept that is constructed and influenced by difference perspectives,[32] a smaller setting, in which students have opportunities to discuss material with each other may be more appropriate.

**How will I Modify the Design Elements in my Classroom?**

After analyzing the contextual factors of the original innovation (who, when, and where), determine which contextual differences have meaningful implications for the innovation. If meaningful contextual differences are identified, what adaptations are needed for the innovation to fit the new context?[19] This final analysis should occur at the level of determining which design elements should and should not be included in the implementation from one setting to another. The difficulty here is determining which elements can be implemented exactly as they were in the original design and which ones must be adapted to fit the new context.[6,10] Part of this decision-making process is to determine which elements are most critical to the instructors' learning goals and classroom context; some design elements interact with others and must be implemented together, while others may be superfluous.[34]

As an example, if your students have less disciplinary experience or the course falls at an earlier point in the curriculum, additional scaffolding may be necessary to support the students in successfully completing the learning activities. Scaffolding in educational design includes strategic supports provided by the instructor, such as concept maps, visual representation of material, etc., to assist learners in succeeding in tasks they otherwise would not be able to complete alone.[35] Other modifications may include using additional preparatory activities or

varying the timing of the learning activities (using the activity later in the semester or allowing more time for the activity), or additional training and modifications to the design.[29] Table 3 in Appendix A provides a structure for analyzing the implications of the differences in the educator's current context from the original innovation and determining necessary adaptations.

And finally, educators must use on-going assessments to determine if their goals are being met. In considering the transfer of an innovation into a new setting, this includes examining the assessments embedded in the design (as discussed in the "Why" section of the framework), and then determining whether they are aligned with your learning goals [20] and the learning theory the innovation is based on. [12] Refer to Table 1 in Appendix A regarding overall assessment of learning: What assessments did you use? Did the results indicate that you had achieved your goal? Answering these questions will help the educator determine if the assessments tied to the innovation are appropriate to keep or whether new ones should be considered, as well as whether a different tool is needed altogether.

## Summary

Medical education is shifting from a conceptualization of learning as a passive transfer of information to a field in which active learning is emphasized.[36,37] A multitude of new teaching innovations have been published in the medical education literature as part of this shift.[38-41] Educational innovations, however, rarely transfer effectively from one program to another in their original form. Effective adoption of these new teaching strategies in diverse classrooms requires analysis and adaptation of the original innovation to fit into the new context. This paper has presented a framework that draws on design-based research to guide educators in the process of mutual adaptation to most effectively introduce new teaching strategies into their settings. The framework shifts the focus from the finished product of a teaching innovation to the

process of analysis, adaptation, and ongoing development in the transfer of teaching strategies. We present this framework as an effort to help health science educators examine new educational ideas and adapt them to their own settings.

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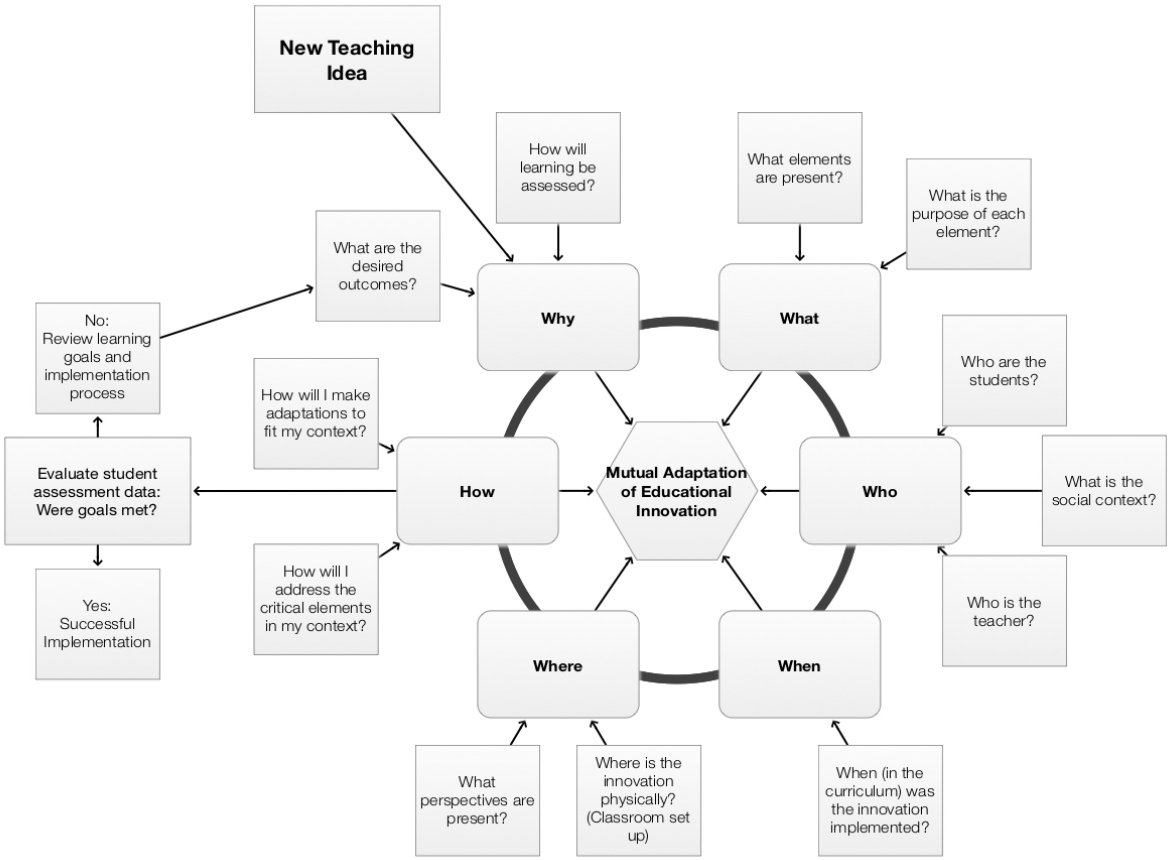
Figure 1: Overview of the Framework



## Appendix A

### Worksheet for Analysis of Educational Innovation

This worksheet guides the application of the framework for analysis and adaptation of educational innovation from one setting to another

**Source/Reference for Original Tool/Innovation**

**Brief Description of the Original Tool/Innovation**

**Learning Goals for your class (why are you using this tool/innovation?)**

**What are the key design elements? (Table 1)**

| The Learning Task/ Overall Purpose or Goal: | | | |
|---|---|---|---|
| Design Element | Purpose/Goal | Feedback/ Assessment for the specific activity | Technology or Other Resources Needed |
| Learning Activity 1: | | | |
| Learning Activity 2: | | | |
| Learning Activity 3: | | | |
| Overall Feedback on the Learning Task: (How will the learners know they have succeeded?) | | | |
| | | | |
| Overall Assessment of Learning: (How will you know the learning goal has been met?) | | | |
| | | | |

**What are the Contextual Differences (Table 2)**

| | | Original Context | Current Context | Is the difference meaningful to teaching/learning? |
|---|---|---|---|---|
| **Who** | Students | | | |
| | Program Culture | | | |
| | Teacher | | | |
| **When** | Timing in Curriculum | | | |
| **Where** | Physical Setting | | | |
| | Conceptualization of knowledge | | | |
| | Perspectives | | | |

**How will I modify the Design/Innovation (Table 3)**

| Difference Identified | Necessary Element? | Additional Scaffolding? | Additional Student Preparation? | Additional Instructor Preparation? |
|---|---|---|---|---|
| | | | | |
| | | | | |