Health Professions Education Research Primer

HPER

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Table of Contents

4-1 Considerations for Research Ethics in HPE
Teresa Chan

4-2 Working Collaboratively: Building a Research Team
Yusuf Yilmaz & Sandra Monteiro

4-3 Road to Publication
Siraj Mithoowani & Teresa Chan

4-4 Research Project Logistics: Project Management and Study Schedules
Mark Lee

4-5 Planning Knowledge Translation and Dissemination Activities
Teresa Chan & Siraj Mithoowani

4-6 Design Fiction Scenarios for Health Professions Education Research
Arianna Mazzeo & Teresa Chan

UNIT 1:
THE NATURE OF KNOWING

Unit 1 is about becoming familiar with a wide variety of current health professions education (HPE) research, scholarship, techniques, and considers several approaches to advancements in the field. It covers a wide range of topics in HPE research, from epistemological philosophy to various applications of research methodologies.

1-1
The Philosophy of Science

SANDRA MONTEIRO AND RENATE KAHLKE

Overview

Health professions education research benefits from the contributions of multiple fields and disciplines, ranging from engineering to kinesiology to sociology. However, these disciplines bring with them a range of different assumptions about the "objectivity" of science and appropriate ways of generating new knowledge. As a result, there are tensions between philosophies that understand knowledge to be stable and those that understand knowledge as more subjective or socially constructed. Understanding what these distinctions mean and how they impact your study design is critical so that the logic of your goal, theoretical framework, design, results and interpretations are philosophically aligned.

> **_Key Points of the Chapter_**
>
> By the end of this chapter the learner should be able to:
> 1. Describe the concept of epistemology
> 2. Describe at least 3 epistemologies in health professions education
> 3. Identify the epistemology with which they identify

Vignette

Rayna (they/their) was always interested in science and wanted a career in healthcare. They cared deeply about research and improving healthcare. As a program director, Rayna encouraged a culture of inquiry and best practices in education. Their own interests in science inspired the creation of education rounds, so that faculty and trainees could share and explore new ideas in health professions education. For the department's first event, Rayna invited a senior clinician educator to present research on competency-based medical education (CBME). At one point in the presentation, the speaker referred to the epistemologies behind most CBME research, and how those epistemologies change the kind of evidence the research produces.

Rayna was immediately thrown, as the obvious question that floated through her mind was: 'what is an epistemology?'

The speaker kept going on and on about the importance of constructivist perspectives, but Rayna didn't really feel like she had a clear understanding of what constructivism is – let alone what it looks like in a research study. And why did the speaker describe most approaches as positivist?

But being the program director, Rayna found that this was a rather uncomfortable question to pose in front of everyone...

An Introduction to Philosophies of Science

Philosophies of science (1,2) are foundational to all research, although many people are exposed to science, research and the scientific method without a full appreciation of the different philosophies of science that underpin the different types of evidence they encounter. The dominant philosophy in science, indeed the oldest, is positivism. Positivism is defined as a view of the world where there is one truth to be discovered. The basis of positivism is empiricism, which prioritizes knowledge as only that which is observable and measurable.

The scientific method then is the ideal approach to uncover the one truth. The strict scientific method is often described as rigorous, and objective. The goal is to introduce objectivity into a study so that the experimenter does not unduly influence the results with their own biases. Many will be familiar with the concept of the randomized-control trial, as an example of good science in healthcare. This methodology is held at the highest standard of rigor because of the ability to manage all variables and isolate them within a controlled environment, free of irrelevant contexts. However, this has inappropriately been used as a standard against which to compare other methodologies. In material sciences, such as chemistry, a purely positivist perspective is manageable. There are known properties of chemical compounds and also known interactions with different environments; knowledge that was gained through carefully controlled studies. However, a pure positivist perspective is fraught with challenges as we consider the science of the mind, and education science. For example, consider the fluid state of knowing and doing the right thing (3).

Health professions trainees are capable of fully understanding and supporting the ideal behaviour in practice, but various factors will influence their decision to take action. These factors include the situational context and their own values, which may lead them to choose different actions for seemingly identical scenarios. It is impossible – and even undesirable – to try to control for all of these different known and unknown variables. To understand educational research from a positivist lens would be to assume that there is only one way to understand a problem and that highly controlled experiments are the path to finding out what it is.

While post-positivism is still committed to the pursuit of truth, but accepts that context, measurement error and individual differences create different outcomes, preventing us from ever really getting to a single truth (4). There is general acknowledgement that science is about uncovering generalizable principles, but that research is filtered through human perceptions and imperfect research methods and instruments. As a result, the job of the post-positivist is to get as close as possible to "truth" with an awareness that their efforts are fallible and their results will always be, at best, an approximation of that truth. Post-positivist researchers in HPE don't seek to find "the Truth" of a problem; rather, they are looking

for smaller truths that, together, form a more accurate picture of a problem. Approximating truth, though, is still the goal. They carefully select and control their methods to reduce bias as much as possible.

Interpretivism (5) and its close relative, constructivism, assert that knowledge and indeed reality, are not "out there" to be discovered. Rather, people (including researchers) actively interpret and construct their reality. In other words, interpretivist researchers tackle complicated problems and do not assume that "truth" exists independently of people's interpretations. Constructivism adds that those interpretations are social in nature – individuals cannot independently interpret the world. They are always interacting with meanings generated by and with others, and these interactions form the basis of their own interpretations. HPE researchers coming from these perspectives assume that their research should seek to understand how meaning is constructed by participants, and how researchers are part of that meaning-making.

Finally, critical philosophies assume that all of our understandings of reality, and our constructions of the truth, are mediated by power. Similar to interpretivism, critical theorists assume that reality is constructed. However, they believe that our world is fundamentally shaped by power, wielded by individuals and organizations, and shaped over time by social, political, cultural, racial, and gender constructs (6). While power is an inevitable part of society, its current distribution is fundamentally unjust. Thus the primary unit of analysis for HPE researchers informed by a critical philosophy is power, and their goals are focused on critique aimed at making change to enhance social justice.

The following table (Table 1.1.1) details a summary of dominant epistemologies in the health professions. Although listed here as somewhat discrete categories, it is possible for individual beliefs to vary based on context, such that even the same individual will align with different epistemologies at different times (4)

Table 1.1.1: Dominant epistemologies and their impact on research approaches

Epistemology	Relevant Ontology	Impact on approach to research
Positivism	Reality, or truth, is knowable. There are generalizable principles that govern everything.	Knowledge describes reality for all. Knowledge can be captured and shared in objective and neutral ways. Promotes deductive reasoning from question, to constrained expectations and hypotheses to clear interpretations of outcomes. Replication of study results is often required to ensure sound science.
Post-positivism	Reality, or truth, is knowable. There are generalizable principles that govern everything. Unfortunately, because of the complexity of the human mind, and limitations of our methods, we will never really get to the truth.	Knowledge represents a parsimonious perspective of reality. A parsimonious perspective is one that should generalize to all (really most) situations. The idea being that the simplest explanation is best, even if it is not true for every situation. There is recognition that reality cannot be measured directly. However, hypotheses and expectations can be made clear, and the keen scientist should be open to the message held within the data. Replication of study results should always be sought.
Interpretivism	Reality and truth are not directly measurable. 'Truths' are malleable and may shift even from the perspective of the same person across time and context. 'Truths' may also be influenced by the researcher.	The data can reveal multiple truths to anyone who is listening closely enough.
Constructivism	Reality and truth are not directly measurable. 'Truth' are realized in the context of social interactions as our understanding of our own experiences is determined by out relation to others.	The data can reveal multiple truths to anyone who is listening closely enough. Indeed the apparent truth may be different depending on who is listening (i.e. conducting the analysis). Researchers should be transparent regarding their reflexivity. Replication of study results would never be expected or sought. Participant bias may be a finding, but not an element to control in the pursuit of meaning
Critical Theory	Reality and truth are not directly measurable. Our understanding of reality and truth change with shifts in organizations of power.	The data can reveal multiple truths to anyone listening closely enough. These interpretations will be influenced by power dynamics. The goal of critical theory research is to critique unjust power dynamics to improve equity.

In summary, when debating, designing, conducting, analyzing or interpreting research goals and findings, consider the assumptions you are making along the way. Good research is based on an alignment between one's epistemology and the chosen research methods. Critically, impactful research requires appropriate storytelling that presents findings that can translate across multiple epistemologies. If you are not sure you want to commit to one and only one epistemology, then approach your work with the following principles in hand:

- **Objectivity** - Objectivity is valued by positivists and post-positivists but research does not exist in a vacuum. All research is driven by subjective research interests, goals, and decisions. Even the most seemingly positivist basic science experiment may have subjectivity introduced by the study designers.
- **Subjectivity** - Inherently, subjectivity is not all bad but pretending that there is no room for subjectivity in your science is problematic. Being transparent about one's perspectives and research goals leads to excellent science as the reader can use their own judgment in interpreting the research question and the results. Indeed the reader may also choose to replicate or build on the study using a different perspective, enhancing our overall knowledge of the phenomenon.
- **Transparency** - Consider how you can examine and communicate your perspective or subjective decisions within your research. Start by communicating them to yourself. Consider discussing them to colleagues. You may also want to attempt to communicate these beliefs through your writing. In any event, be reflexive and transparent about your decisions and the impact of your subjective experience on your own findings and those of other scientists. Exploring these concepts and questions can better prepare you to help others understand your work.
- **Ethics** - Good science is built on an ethical approach to design, recruitment, and analysis. Just as there are standards for ensuring the fair and ethical treatment of human and nonhuman participants, so too, being attentive to one's perspectives and decisions ensures that the results are handled ethically. Regardless of whether you take a critical perspective, it is important to consider the power dynamics at play and the impact of your research on participants and communities. This section is discussed in much greater detail in [Chapter 4-1](#).

Vignette Conclusion

Rayna was able to meet with a close colleague over coffee and discuss the issues after the rounds. The colleague shared a link to some interesting podcasts and reading materials to help Rayna explore these concepts independently. Importantly, Rayna begins to understand that this is a fundamental concept that they must work

harder to incorporate into the beginning stages of our scientific process.

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Other Suggested Resources

1. MERIT Podcast by Drs. Chan and Varpio - Nature of Knowing

Click the above picture or use this link to listen to the podcast: https://soundcloud.com/user-374660407/episode-1-the-nature-of

2. Meredith Vanstone - Philosophical Worldviews (macpfd.ca)

Click the above picture or use this link to listen to the podcast: https://youtu.be/5LPJZ2vK-Qk

3. KeyLIME Podcast - Varpio consult #1
[KeyLIME: [274] #1 The Best of KeyLIME from 2018. A Philosophy of Science Primer (libsyn.com)](#)

4. KeyLIME Podcast - Varpio consult #2
Click the above picture or use this link to listen to the podcast: [https://keylimepodcast.libsyn.com/163-keylime-methods-consult-2-a-philosophy-of-science-primer](#)

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1-2 The Nature of Evidence: Inductive and Deductive Reasoning

RENATE KAHLKE, JONATHAN SHERBINO, AND SANDRA MONTEIRO

Overview

Different philosophies of science ([Chapter 1-1](#)) inform different approaches to research, characterized by different goals, assumptions, and types of data. In this chapter, we discuss how post-positivist, interpretivist, constructivist, and critical philosophies form a foundation for two broad approaches to generating knowledge: quantitative and qualitative research. There are several often-discussed distinctions between these two approaches, stemming from their philosophical roots, specifically, a commitment to objectivity versus subjective interpretation, numbers versus words, generalizability versus transferability, and deductive versus inductive reasoning. While these distinctions often distinguish qualitative and quantitative research, there are always exceptions. These exceptions demonstrate that quantitative and qualitative research approaches have more in common than what superficial descriptions imply.

By the end of this chapter the learner should be able to:
1. Describe quantitative research methodologies.
2. Describe qualitative research methodologies.
3. Compare and contrast these two approaches to interpreting data.

Vignette

Rayna (they/their) stared at the blinking cursor on her screen. They had been recently invited to revise and resubmit their first qualitative research manuscript. Most of the editor and reviewer comments had been relatively easy to handle, but when Rayna reached Reviewer 2's comments, they were caught off guard. The reviewer acknowledged that they came from a quantitative background, but then went on to write: "I am worried about the generalizability of this study, with a sample of only 25 residents. Wouldn't it be better to do a survey to get more perspectives?"

Rayna hadn't seen any other qualitative studies talk about generalizability, so they weren't entirely sure how to address this comment. Maybe the study won't be valuable if the results aren't generalizable! Reviewer 2 might be right that the sample size is too small! They immediately panic-email one of their co-authors:

To: Cal <cal@mcmasterx.ca>
From: Rayna <raynadirector@mcmasterx.ca>
Subject: HELP!!!! ?
[Attachments 1]

Hi Cal – I'm really struggling with some of the reviewer questions on our manuscript, especially the one about generalizability (attached). Can you help?

Rayna

Within a few hours, Cal responds:

> **To: Rayna <raynadirector@mcmasterx.ca>**
> **From: Cal <cal@mcmasterx.ca>**
> **Subject: Re: HELP!!!! ?**
> **[Attachments 8]**
>
> Hi Rayna,
>
> We get these kinds of reviews all the time. Don't worry, it's not a flaw in your study. That said, I think we can build our field's knowledge about qualitative research approaches by explaining some of these concepts. Start with the one by Monteiro et al. and then read the one by Wright and colleagues. These are both good primers and will give you some language to help respond to this reviewer.
>
> If you draft a response, I can help you wordsmith afterward. Hope all is well on the wards!
>
> C

With a sigh of relief, Rayna reads through the attached papers (1-8) and continues her mission to craft a response.

Deeper Dive on this Concept

Qualitative and quantitative research are often talked about as two different ways of thinking and generating knowledge. We contrast a reliance on words with a reliance on numbers, a focus on subjectivity with a focus on objectivity. And to some extent these approaches are different, in precisely the ways described. However, many experienced researchers on both sides of the line will tell you that these differences only go so far.

Drawing on Chapter 1-1, there are different philosophies of science that inform researchers and their research products. Generally, quantitative research is associated with post-positivism; researchers seek to be objective and reduce their bias in order to ensure that their results are as close as possible to the truth. Post-positivists, unlike positivists, acknowledge that a singular truth is impossible to define. However, truth can be defined within a spectrum of probability. Quantitative researchers generate and test

hypotheses to make conclusions about a theory they have developed. They conduct experiments that generate numerical data that define the extent to which an observation is "true." The strength of the numerical data suggests whether the observation can be generalized beyond the study population. This process is called deductive reasoning because it starts with a general theory that narrows to a hypothesis that is tested against observations that support (or refute) the theory.

Qualitative researchers, on the other hand, tend to be guided by interpretivism, constructivism, critical theory or other perspectives that value subjectivity. These analytic approaches do not address bias because bias assumes a misrepresentation of "truth" during collection or analysis of data. Subjectivity emphasizes the position and perspective assumed during analysis, articulating that there is no external objective truth, uninformed by context. (See Chapter 1-1.) Qualitative methods seek to deeply understand a phenomenon, using the rich meaning provided by words, symbols, traditions, structures, identity constructs and power dynamics (as opposed to simply numbers). Rather than testing a hypothesis, they generate knowledge by inductively generating new insights or theory (i.e. observations are collected and analyzed to build a theory). These insights are contextual, not universal. Qualitative researchers translate their results within a rich description of context so that readers can assess the similarities and differences between contexts and determine the extent to which the study results are transferable to their setting.

While these distinctions can be helpful in distinguishing quantitative and qualitative research broadly, they also create false divisions. The relationships between these two approaches are more complex, and nuances are important to bear in mind, even for novices, lest we exacerbate hierarchies and divisions between different types of knowledge and evidence.

As an example, the interpretation of quantitative results is not always clear and obvious – findings do not always support or refute a hypothesis. Thus, both qualitative and quantitative researchers need to be attentive to their data. While quantitative research is generally thought to be deductive, quantitative researchers often do a bit of inductive reasoning to find meaning in data that hold surprises. Conversely, qualitative data are stereotypically analyzed

inductively, making meaning from the data rather than proving a hypothesis. However, many qualitative researchers apply existing theories or theoretical frameworks, testing the relevance of existing theory in a new context or seeking to explain their data using an existing framework. These approaches are often characterized as deductive qualitative work.

As another example, quantitative researchers use numbers, but these numbers aren't always meaningful without words. In surveys, interpretation of numerical responses may not be possible without analyzing them alongside free-text responses. And while qualitative researchers rarely use numbers, they do need to think through the frequency with which certain themes appear in their dataset. An idea that only appears once in a qualitative study may have great value to the analysis, but it is also important that researchers acknowledge the views that are most prevalent in a given qualitative dataset.

Key Takeaways

- Quantitative research is generally associated with post-positivism. Since researchers seek to get as close to 'the truth', as they can, they value objectivity and seek generalizable results. They generate hypotheses and use deductive reasoning and numerical data numbers to prove or disprove their hypotheses. Replicating patterns of data to validate theories and interpretations is one way to evaluate 'the truth'.

- Qualitative research is generally associated with worldviews that value subjectivity. Since qualitative researchers seek to understand the interaction between person, place, history, power, gender and other elements of context, they value subjectivity (e.g. interpretivism, constructivism, critical theory). Qualitative research does not seek generalizability of findings (i.e. a universal, decontextualized result), rather it produces results that are inextricably linked to the context of the data and analysis. Data tend to take the form of words, rather than numbers, and are analyzed inductively.

- Qualitative and quantitative research are not opposites. Qualitative and quantitative research are often marked by a set of apparently clear distinctions, but there are always nuances and exceptions. Thus, these approaches should be understood as complementary, rather than diametrically opposed.

Vignette Conclusion

Rayna smiled and read over their paper once more. They had included an explanation of qualitative research, and how it's about depth of information and nuance of experience. The depth of data generated per participant is significant, therefore fewer people are typically recruited in qualitative studies. Rayna also articulated that while the interpretivist approach she used for analysis isn't focused on generalizing the results beyond a specific context, they were able to make an argument for how the results can transfer to other, similar contexts. Cal provided a bunch of margin comments in her responses to the reviews, highlighting how savvy Rayna had been in addressing the concerns of Reviewer 2 without betraying their epistemic roots. The editor certainly was right – adding more justification and explanation had made the paper stronger, and would likely help others grow to better understand qualitative work. Now the only challenge left was figuring out how to upload the revised documents to the journal submission portal...

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1-3 Common Methods of Education Research

RENATE KAHLKE AND SANDRA MONTEIRO

Overview

Many research methodologies are closely linked to specific fields, but in the health professions, we borrow methodologies from various disciplines (See Chapter 1-1). For example, carefully controlled experiments, in which all known variables are measured or standardized, are required in studies of chemical reactions. Researchers must be able to clearly report the sequence of methods used and the precise measurements of all elements included in each study in order to allow for replication of their study design and possibly also their results. In these contexts, the ability to follow closely the same steps and reproduce the same results is synonymous with scientific rigour. In health professions education research, the main focus is on the experience and study of phenomena related to humans. Humans (and the contexts in which they interact) are complex and cannot be controlled as well as chemicals. Furthermore, most contexts present significant constraints on the kind of research that can be conducted. While a chemical reaction can be replicated several times using identical elements, each human participant in a study brings a plethora of experiences that can create unpredictable outcomes. Therefore, research methods must be used more flexibly, so that the concept of scientific rigour is not as closely tied to standardized procedures, precisely measured elements or replication. Indeed, it is more likely that replication is not exactly possible across diverse contexts. Additionally, study results may need to be interpreted flexibly; inductively or deductively (Chapter 1-2). This chapter first describes several well-defined methods and then introduces the reader to some central principles to guide the selection of a research methodology. It then briefly presents worked examples of how to translate interesting phenomena into a researchable question that can be matched to a feasible research method.

By the end of this chapter the learner should be able to:
1. Describe the importance of aligning a research question to a methodology.
2. Identify at least 4 common methodologies used in Education Research.
3. Translate their phenomenon of interest into several research questions that can be matched to methodology.

Vignette

Having successfully published their first qualitative research paper, an ambitious constructivist grounded theory study, Rayna was now interested in testing the prevalence of the phenomenon and wanted to know if these experiences were universal. They realize that this new work may bring them back to a quantitative research wheelhouse. They begin to construct a team with the goal of designing an experiment. However, at their first meeting, there is strong disagreement amongst the team that an experiment is the best choice.

Deeper Dive on this Concept

All phenomena can be studied using methods that are classified as qualitative, quantitative or both (mixed). Qualitative methods rely on data that are less structured: words, pictures. These can include drawings, live observation, interview-based conversations and focus group interactions. Quantitative methods rely on data that are more structured: numbers. These can include test scores, survey responses to scaled responses, counts of events, and counts of people. As implied, mixed methods integrate both kinds of data in one study. We will first explore the elements of specific designs. You may find that your prior experience with research will anchor you to certain types of research questions and study designs; if your thesis included regression modelling, all papers seem to be able to be done via regression modeling from then on. However, in HPER, as we have demonstrated earlier, limiting yourself to one approach

often limits your goals and your ability to have a broader impact ([Chapter 1-1](#)). The best way to break that cycle is to expand your worldview. In [Chapter 2-1](#), we describe how you might DO a literature review for METHODS in your domain. Use this to understand what other types of science are being used to better understand your topic.

Expanding your own world view does not mean you have to be an expert in every design; methodological playfulness is not for everyone. The best way to learn new methods is to partner and collaborate. Consider the principles covered in [Chapter 4-2](#) on working collaboratively to build a research team.

Common Methodologies in Health Professions Education Research

Collaboration generally begins with some shared understanding. To begin building your knowledge of different research methodologies, we describe seven common research methods used in HPE, across qualitative, quantitative and mixed methodologies

Qualitative

Qualitative research is increasingly common in medical education, and is used to describe a phenomenon or to understand how or why the phenomenon works the way it does. In what follows, we offer an introduction to three common qualitative methodologies. And while there is overlap between most qualitative methodologies, each has unique goals and procedures. Differentiating between them will help you make choices about which methodology might be the best fit for your research goals and context

Constructivist Grounded Theory (1) is a methodology commonly used in HPE research. As its name suggests, it is best used to generate new theory on a social process or phenomenon. To do this, it relies on hallmark methods such as concurrent analysis (data are generated and analyzed at the same time), theoretical sampling (researchers use concurrent analyses to direct their sampling toward the participants best able to inform the development of their theory), and constant comparison (researchers iteratively return to the data to compare data to each other, and their developing analyses to the data).

Phenomenology is the study of experience. Rather than seeking to theorize experience across participants (as in *Constructivist Grounded Theory*), they seek to deeply understand the nature of a phenomenon for those who experience it first-hand. A hallmark of phenomenology includes deep engagement with individual participants, often through lengthy and recurring interviews.

Ethnography is one of the oldest qualitative research methodologies. Ethnographers study culture, usually within defined social groups (in interprofessional teams, for example, or within a class of first-year medical students). They spend significant time in the field and conduct observations to study the group's social processes and practices; they also often interview participants or review documents to try to make meaning out of what they observe, from different perspectives.

Quantitative

While the culture of research in the health professions is changing, there remain strong beliefs regarding the rigour of quantitative methodologies. One reason is that the Randomized Control Trial (RCT) is held as the gold standard for clinical research, and so remains a dominant paradigm in the mind of most clinicians. While it is possible to design an experiment similar to an RCT to evaluate education theory, often it is not possible to maintain the strict constraints in education studies. For example, it would be impossible to control multiple participant characteristics, or ensure that participants are not exposed to other training or experiences which could influence study results. Therefore, most experiments in education are really *practical trials*.

Practical trials are essentially RCTs in which one or more elements are not possible. For example, in a longitudinal study of different approaches to education, it may not be possible to randomly assign students to different groups. In this case, the researcher may have to rely on naturally occurring cohorts to act as 'groups'. Health professions education can benefit from practical trials that evaluate whether proposed theories stand up to the complexity of semi-controlled contexts. Convenience sampling and pseudo-random assignment are acceptable techniques.

Surveys are structured questionnaires which measure self-reported attitudes, experiences or behaviours. These responses are expected

to define how much of a given construct a respondent has. Health professions education can benefit from surveys that detect common patterns in attitudes and experiences. However, this methodology is easy to overuse or use poorly. Consider reviewing guides on survey design (2-4).

Case audits are studies that examine how often clinical practice guidelines are followed. These studies can be useful to identify areas in health professions education that require more attention. Alternatively, audits can measure the effectiveness of a recent education intervention on changing practice or improving patient safety. For example, an audit approach combined with an *in situ* training can measure the impact of quality improvement initiatives.

A Note about Mixed Methods

Mixed methods designs are increasingly popular in health professions education and, while they are not the right answer to every research question, they can offer the benefits of both qualitative and quantitative study designs.

Good mixed methods designs are thoughtful about how qualitative and quantitative data will be combined to best answer the research questions. There are many different ways of thinking about mixed methods design, but a common way of thinking about mixed methods involves distinguishing between convergent/ parallel designs (in which qualitative and quantitative data are generated separately but simultaneously, then integrated in the final analysis) and sequential designs (in which one type of data is generated first and used to inform the other). Sequential designs can be exploratory (where qualitative data are first generated to explore the phenomenon that quantitative data can then confirm) or explanatory (where quantitative data are generated first, then used to inform qualitative exploration of the phenomenon).

Making Choices

The choice of which method to use depends on the available resources (which includes methodological expertise), the aspect of the phenomenon that is being studied, and the perceived impact of the kind of data that will be produced. The first step in designing any study is to clearly identify your goal. Do you want to inform? Do

you want to better understand? Do you want to change behaviour? A different version of these goals is described by Cook et al. (4). In this chapter we explore the goals of informing, understanding and changing behaviour because the central focus is not an education intervention; rather we consider the broader concept of exploring phenomena in health professions education. The second step is always to read around the topic in depth; re-evaluating your goal if necessary. The third step is to translate your goal into a research question, which will likely point you to the best research methodology. Let's consider these potential research goals, using the phenomenon of 'burnout' to explore how each goal might translate into a research question.

To Inform

At one point, the concept of burnout among health professionals was not well understood. In this case your goal may be to describe burnout to increase awareness and motivation to study it closely. This goal seems best aligned with an observational study, or a survey. In an observational study, you would act much like an anthropologist, or ethnographer, observing all evidence of the phenomenon in practice. You could rely on a rigorous literature review to refine your approach and the contexts you choose to observe. An observational study of burnout could be quite ambitious as it may require following individuals closely, observing people at their lowest points and multiple observer perspectives at multiple time points. On the other hand, a survey allows various individuals to report their experiences in an anonymized and structured manner. A carefully crafted survey, supported by a rigorous literature review, can tap into shared experiences, common definitions and frequencies of events related to burnout. Your own preference for one of these designs and access to the necessary resources will ultimately drive your decision. If you refined your goal into a specific research question, such as "How often is burnout experienced among emergency department nurses?", the alignment to a survey becomes clearer.

To Understand

Perhaps you have read about a phenomenon and you want to explain it further. If we stay with the burnout example, you would be joining many health professions education researchers who have explored

this phenomenon in a variety of ways. Your literature review will help you identify what aspect of burnout you want to understand better, which could lead you to a very specific question: "How does family support impact the experience of and recovery from burnout?", for example. This particular question is not well aligned to a quantitative methodology. Primarily because this is not a phenomenon that can ethically be studied using an experiment, and a survey would not facilitate the rich data required to explain the role of family support. In a situation like this, a study that relies on data gathered during interviews with health professionals who experienced burnout would be more valuable. You might use phenomenology to develop a rich appreciation of the experience or constructivist grounded theory to develop a theory of the process of recovering from burnout. Subsequently, once you feel you have a strong understanding of the phenomenon, and have developed a theory of how it manifests, you may choose to design a survey to support your theory.

To Change Behaviour

Building on the prior goals of exploring and understanding, you may now be interested in changing how health professionals respond to signs of burnout. Your previous research or literature review may have provided you with insights regarding how best to prevent burnout or reduce its impact. In this case you might be interested in gathering evidence in favour of these strategies and exploring options for funding to introduce these strategies at your local institution so that you can study their impact. Some researchers benefit from, for lack of a better word, luck. For example, if a new program to help with burnout is introduced at your institution, you suddenly have the ideal context (informally known as a 'natural experiment') for gathering evidence of outcomes. Much like an experimental design, you could work with the program directors to design two intervention groups and measure the outcomes quantitatively, through a survey of burnout, or qualitatively, through a series of interviews. Your findings may then support investment of additional resources in the strategies that had the most positive impact, or the one that was most feasible and cost effective.

By framing research through these 3 potential goals, we hoped to highlight how fluid choices in research methodology can be. In contrast to the notion that there is one 'gold standard' methodology, the goal of this chapter is to emphasize that the choice of research methodology is dependent on numerous factors. Indeed, the same

group of researchers may use a multitude of methodologies to investigate the same phenomenon, creating a robust and impactful program of research. However, your specific and immediate goal will determine which approach you should choose. Consider reading more on this topic (6, 7). Table 1.3.1 details some worked examples.

Table 1.3.1: Worked Examples of Qualitative Methods in Health Professions Education (8)

Domain	Research Question	Ideal Study Design
Wellness in health professions trainees	What factors affect the wellness of undergraduate trainees?	Identify potential factors and evaluate their impact using a survey (quantitative)
	How do undergraduate trainees describe the relationship between wellness and academic success?	Create an interview guide that helps participants explore their experiences of academic success and wellness - (qualitative)
Acquisition of expertise in medical diagnosis	Is it more effective to learn diagnosis through examples or symptoms and features?	Design an experiment - practical trial - that compares diagnostic accuracy of participants exposed to different approaches to learning (quantitative)
	When do medical trainees feel confident about their diagnostic expertise?	Create an interview guide that helps participants explore their first realization of their own expertise (qualitative)
Development of surgical skills	How much independence do faculty allow trainees as they develop surgical skills in the operating room?	Design an observational study of attendings and trainees in the operating room (qualitative)
	How reliable are in training evaluations reports (ITER) of surgery trainees?	Gather assessment data from multiple ITERs and conduct a generalizability analysis (quantitative)

- **Single goal** - Spend some time developing a clear goal for your study. Conduct a rigorous literature review to understand prior work on the phenomenon of interest (See Chapter 2-1). Through this review you will discover how much others have already contributed to the same goal. Additional goals can be assigned to future studies and different study designs.

- **Clarity** - Spend time with your research team developing a clear plan and ensure that everyone on the team understands and supports the goal. Your reflections on your literature review and goal setting will help you develop a clear vision of your available resources, timeline, participant pool, context and potential data structure.

- **Specificity** - Develop a research question that is specific to your goals. A specific question will guide the design of your study. This is particularly important to convey to yourself, co-authors and readers (if you publish your work) what you did. This question will also help keep you on track when things get complicated (as they tend to do in education research).

- **Feasibility** - Be open to variations on your goals and questions. Explore the feasibility and cost of your proposed study to make sure that all components are manageable.

Vignette Conclusion

After some discussion, Rayna and the rest of the research team agreed to proceed with a few study designs. The group felt it was best to first conduct an observational/qualitative study before proceeding to identify quantitative methodologies for exploring how different factors affect the phenomenon.

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UNIT 2: APPROACHING THE PROJECT

Unit 2 requires the consideration of aspects of completing research or development activities, including literature searching and reviews, articulating one's research objectives, methods and analyses, and then defending those methods. Unit 2 will provide a strong foundation for the generation of successful, high-quality research proposals that will foster novel insight in health professions education.

2-1 Searching and Reviewing the Literature

CATHERINE TONG AND TERESA CHAN

Overview

An important first step in a scholarly project is to "do a literature review". Why are literature reviews important? What are the different types of literature reviews? Could literature reviews become stand-alone scholarly projects? In this chapter, we will explore the answers to these questions.

Key Points of the Chapter

By the end of this chapter, readers will be able to:
1. Articulate how literature reviews serve many important purposes in a scholarly project.
2. Select an appropriate literature review that ensures that the project is well-positioned to advance the field of inquiry.
3. Describe how literature reviews can be turned into works of scholarship.

Vignette

Darla and Lemy stared at their screen for the second hour in a row. They had been tasked to conduct a literature review but they weren't even really sure how to get started. Their supervisor had tasked them to conduct a proper literature review prior to starting their study protocol, and now they were in the library starting at the blank search bar on the PubMed website.

Darla broke the silence first: "Lemy... I think we probably need to understand WHY we're doing this literature review first... I mean, are we just trying to find papers that help us understand the topic? Are we trying to find papers that have used similar methods to our current study design? I'm not sure what we should even search for?"

They were very confused. As someone who had not done a lot of research before, Lemy felt very lost as well.

"I think we need help... Do you think we could go ask one of the librarians?" Lemy asked.

"Great idea," replied Darla. "I wonder if someone at the help desk could book us in..."

"Oooh, and I think Dr. Martinez also sent us a link to the HPER manual where we might be able to get a sense of what we need to do..."

Deeper Dive into this Concept

Why do we need to do a literature review prior to starting your project?

There are many important reasons to do a literature review. Contributing to research is akin to joining a conversation. We need to be familiar with the conversation before contributing to it in a meaningful manner. This helps us understand where the gaps are, so we could endeavour to fill them (1,2). Once a gap and a research question is identified, literature review can also bring us up-to-

speed on what is already known in the subject, so we can build off of the work already done. Missing relevant literature is one of the top ten reasons for rejection of manuscripts, considering that the reviewers are likely authors and experts on the subject (3). Ultimately, the goal of scholarly projects is to advance the field. With limited resources, it is extremely important to identify the scope and nature of the research subject in order to do so efficiently.

When does the literature review help you as an author of a project?

A great literature review can be the foundation of your expertise in a whole domain of research. When conducting literature reviews, you will find that it can help you gain a greater grasp of what has come before and how you might add to the discourse within an area (1,4). Engaging with a thorough reading of the literature in your area of interest will help you begin your journey to become a scholar and expert in a domain. Let's walk through how an investigator might approach the literature review for a brand-new domain (e.g. new area of interest for your thesis).

BEFORE
Before you begin your study, literature can help you in a number of the following ways:
1. Identify what thoughts and ideas have existed in the field before;
2. Highlight new research questions pondered previously (e.g. scientists expressing what they think are future directions);
3. Help you to find key thinkers and scientists within the field. (Pro Tip: Set Google Scholar Alerts if you can for these folks so that if they publish something new in this domain you'll find out right away).

DESIGN
When formulating your study, it is important to pay attention to what has come before within your field. Sometimes this will be so that you can build upon the lines of reasoning from previous studies, but sometimes it will be to foreshadow a gap you have noticed in the approaches that have come before. For instance, in a certain domain you may find that mainly researchers have only used experimental

designs to date. Some will want to build upon those experiments to continue the lines of thought around these prior works – possibly conducting more nuanced experiments. Others may feel that since the field is populated by experimentalists, it may be worthwhile to bring new epistemologies and methods into this domain. Either way you wish to proceed, a very well conducted literature review is the key to knowing what has come before and to provide you insights into the types of research used to understand your domain.

WRITING

A great literature review will be very helpful when writing your manuscript as well. First off, most authors do experience some sort of writer's block at some point. If you conduct a methodological literature review, which is not topic driven, but rather revolves around the type of study design that you intended to complete you will have greater success.

Often when you are embarking on writing up a study protocol you may find yourself stuck trying to find the right phrases and ideas for how to describe your intended study design. A methodology-based review will help you to gain a better sense of the diverse ways in which authors communicate their studies using the same methods you intend to use. This will empower you to better understand key components of study design. Some would even suggest hitting up resources like the EQUATOR network (5) to see if there are reporting guidelines for the type of study you are hoping to complete – these can scaffold you to think through your study protocol or, later, your manuscript. After all, if you do not factor elements into your study up front, you will have no possibility of reporting this later.

With regards to the usual domain-specific literature review, reading avidly around your topic will help you to construct and contextualize your problem or observation, the gap that you have identified in the literature, and further bolster the case that you have the right question in the end. Citing the right papers can help you to really build your case in the introduction and/or background of your paper. Then, the literature review comes in handy again later as it will help you contextualize your findings in the discussion. Usually in the discussion, authors will begin by summarizing key findings from their study – but then they will be expected to compare and contrast their findings to the field writ large. Having a good literature review

that provides you with a wide basis of knowledge about the field will be key to success in formulating a great discussion for your paper. Lingard describes papers as having a number of different storylines: 1) Coming full circle, 2) Deep exploration, and 3) Surprise insight (6). Each of these story formats for a manuscript usually come to fruition during the discussion. The literature that you foreshadow in the introduction, then, often reemerge within the discussion and now take the spotlight. Without an adequate grounding in the literature that surrounds your paper, it is virtually impossible to write a great introduction or discussion.

PUBLISHING

Finally, a very pragmatic reason for engaging in a great literature review is that your reviewers and editors will expect this of your manuscript. A great literature review helps you survive peer review (3) and get beyond editorial desk rejection (7). In his 2001 paper, Georges Bordage highlights that one of the topic reasons reviewers reject manuscripts is often cited as having an "…incomplete, inaccurate, or outdated review of the literature" (3). In a more recent paper, Meyer and colleagues (7) found that desk rejections (i.e. when editors don't even send a paper out for review) often occurred when there is a "weak discussion and/or conclusions" or "inadequate or incomplete introduction". A great literature review can help to remedy these key problems that often occur.

Can you turn literature reviews into education scholarship?

The simple answer to this question is: Yes, but you don't always have to do this. Many authors do like to engage in multiple wins; many scholars find taking that literature review you have to do anyways and turning it into a work of scholarship is a way to fulfil this mandate. In fact, many scholars have made careers on publishing rigorously conducted reviews, and as such, it is certainly possible to capitalize on turning your literature review into a work of education scholarship.

That said, the rigour of your literature review will vary widely when you are conducting various formats of literature review. Often when you are merely doing your literature review for your own purposes, you'll hit a search engine like Google Scholar or PubMed and just

start entering keywords to hopefully find papers that are relevant. Perhaps you'll use tools like Web of Science to trace through papers and their citations to find other relevant papers. Though circuitous – these methods can be highly helpful to you when you're just learning about a topic and reading for edification.

When you decide, however, that you would like to turn your literature review into a proper piece of academic scholarship, then it is important to conduct a thorough and systematic search where you find the right phrasing and use the exact keywords from the indices of choice. As such, for a scholarly literature review where you aim to publish, you will likely want to involve an academic librarian to peer review your search strategy prior to conducting the search, and moreover, you will need to be more meticulous in your completion of that search. One need only review the relevant reporting guidelines for various types of reviews [systematic review (PRISMA (8), and the PRISMA-S extension (9), meta-analysis (MOOSE (10), or scoping review (PRISMA-ScR (11)] to see that there are high expectations for the types of detailed records you must keep throughout your formal search in order to ensure your literature review is publishable.

What are best practices or reporting guidelines for conducting these reviews?

The following table (2.1.1) lists various types of reviews that are described in the literature (12,13) as well as their matched reporting guideline an example from Health Professions Education.

Table 2.1.1. Types of Reviews in Health Profession Education Research

Type of Review (12,13)	Reporting Guideline & Description	Health Professions Education Research Example
Narrative Review	ENTREQ checklist for qualitative research (14) Identifies and summarizes what has been previously published, avoiding duplication, and seeking new study areas not yet addressed, but the	Norman G, Dore K, Grierson L. The minimal relationship between simulation fidelity and transfer of learning. Medical education. 2012 Jul;46(7):636-47. (16) https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2923.2012.04243.x

	methods used to select the articles may not be described (15).	
Critical Review	No reporting guideline.

Aims to demonstrate that the author has extensively researched literature and critically evaluated its quality. Goes beyond mere description to include degree of analysis and conceptual innovation. Typically results in hypothesis or model. | Kahlke RM, McConnell MM, Wisener KM, Eva KW. The disconnect between knowing and doing in health professions education and practice. Advances in Health Sciences Education. 2020 Mar;25(1):227-40. doi: 10.1007/s10459-019-09886-5 (17) |
| Realist Reviews | RAMESES (18).

Provide a detailed, realistic understanding of complex activities that can be applied to planning and implementing programs | Price T, Wong G, Withers L, Wanner A, Cleland J, Gale T, Prescott-Clements L, Archer J, Bryce M, Brennan N. Optimising the delivery of remediation programmes for doctors: A realist review. Medical Education. 2021 Mar 26. doi: 10.1111/medu.14528 (19) |
| State of the Art | No reporting guideline.

Tend to address more current matters in contrast to other combined retrospective and current approaches. May offer new perspectives on issue or point out area for further research. | Gottlieb M, Chan TM, Zaver F, Ellaway R. Confidence-competence alignment and the role of self-confidence in medical education: A conceptual review. Medical Education. 2021 Jun 27. doi: 10.1111/medu.14592 (20) |
| Scoping Review | Arksey and O'Malley Framework (21,22), The Levac et al update (23) and PRISMA-ScR (11)

Preliminary assessment of potential size and scope of available research literature. Aims to identify nature and extent of research evidence (usually including ongoing research) | Chan TM, Dzara K, Dimeo SP, Bhalerao A, Maggio LA. Social media in knowledge translation and education for physicians and trainees: a scoping review. Perspectives on medical education. 2020 Feb;9(1):20-30. doi: 10.1007/s40037-019-00542-7 (24) |
| Systematic Reviews | PRISMA guideline (8). | Cheng A, Eppich W, Grant V, Sherbino J, Zendejas B, Cook DA. Debriefing for technology-enhanced simulation: a |

	Seeks to systematically search for, appraise and synthesis research evidence, often adhering to guidelines on the conduct of a review.	systematic review and meta-analysis. Medical Education. 2014 Jul;48(7):657-66. doi: 10.1111/medu.12432 (25)
Meta-analysis	MOOSE guidelines (10) Technique that statistically combines the results of quantitative studies to provide a more precise effect of the results.	Ilgen JS, Sherbino J, Cook DA. Technology-enhanced simulation in emergency medicine: a systematic review and meta-analysis. Academic Emergency Medicine. 2013 Feb;20(2):117-27. doi: 10.1111/acem.12076 (26)

The Nuts and Bolts of a Literature Review

Depending on the type of review you are conducting, then the level or rigour that you will need to have for a literature review will vary greatly. If you are just trying to get a sense of the conversations in a field, many scholars increasingly use technologies like Google Scholar, which has some advantages over keyword-driven databases like PubMed, EMBASE, PsychInfo or ERIC. Google Scholar uses a more inclusive search and does not restrict its search just to title and keywords – it searches the entire text of a paper. Google Scholar can be advantageous as then you may be able to discover synonyms or overlapping terminology that you may not yet know about.

Conducting a Pilot Search

Sometimes when you are starting on a literature review, you might not know what keywords to use at the start. A pilot search can be helpful to help you complete this task. You can use broader scholarly search engines like Google Scholar to find papers (and grey literature of relevance, and then you can review what keywords or title language is used by the authors to describe the paper. This pilot search can be used to start constructing a list of possible keywords that you may wish to use in your search strategy.

The Role of a Librarian

Though a librarian is not always necessary for a formal review team, they are an invaluable resource and may be very helpful to you in the early stages of your search process. Academic librarians at some institutions also hold professorial roles, and therefore may wish to be included as co-authors in the paper – so be attuned to your own colleagues and discuss with them early whether this is a goal of theirs. Some librarian staff members may not seek involvement in the authorship process and simply wish to be thanked. It is always good practice, however, to have an open discussion about authorship with any substantive member of the team – and in the case of a formal, publishable literature review paper, your librarian colleague may serve a similar role to a methodologist on another study. Make sure you extend the courtesy and opportunity for them to earn their seat at the table.

The Role of the Crowd or Experts

Sometimes when you are super strapped and lost, then there may be a role for polling the crowd or consulting experts in the field. One group has used a social media-driven strategy to consult the #MedTwitter and #MedEd communities consistently throughout several their review papers (27-29), allowing authors to gain a broader lens on the topic and find papers that are related but may not have the same keywords.

Expert consultation with those who are well-versed in a field may also be quite useful to discern related papers that may not be on your radar because of a number of factors. True experts in a domain may be aware of literature that is in another related field (e.g. K-12 education, organizational psychology) where they have worked previously or have colleagues who conduct related research.

Reporting Guidelines: A Novice Scholar's Best Friend when Reading the Literature

Reporting guidelines, as we have mentioned earlier in this chapter, can be very helpful to novice scholars. They provide an overview of

the reporting standards that experts have agreed upon that different types of studies should adhere to when being published in the literature. While authors may not adhere to every reporting standard (as you will find when you begin to write your own manuscripts), it can be helpful for you

When reading the literature...

Remember, it is very important to remain skeptical whenever reading and citing literature. In order to do this, scholars have created reporting standards which help fields to understand the rigour with which authors are expected to be explicit about their scholarly processes. You can find most of the reporting standards in the EQUATOR network website (5). These guidelines can help to scaffold your review of a specific type of study – for instance, you might find that the PRISMA guidelines (8) are useful when reviewing a systematic review or meta-analysis, or STROBE guidelines (30) are useful for guiding readers to look for important aspects of observational studies. That said, these reporting guidelines do not replace the importance of critically appraising the work for relevance (e.g. does the study examine a similar phenomenon and/or population as you?) and meaningfulness (e.g. are the results meaningful to you as a reader/educator?).

When conducting a review...

While this research primer does not address the specific protocols on how to do a full review, we would also suggest that the reporting guidelines for various types of reviews can be helpful to you as a scaffold for what you should take care to include in your first draft.

If you are doing a formal review, then here are some questions (related to elements in the PRISMA-S extension on literature searches) that may set you off on the right path:
1. Do you list all the database names?
2. Did you use a multi-database searching software? (e.g. OVID)
3. Did you search any study registries?
4. Did you review any online or print source purposively to examine or triangulate your literature? (e.g. manual review of journal tables of contents, proceedings of conferences, websites)

5. Did you conduct a citation search? (e.g. reviewing the cited references in the papers you found originally)
6. Did you contact any further authors or experts?
7. Did you include your full search strategy (copied and pasted exactly as you ran it)?
8. Did you have any limits (e.g. date, time, language) to your search? If you did, please justify or explain why you did so?
9. Did you filter your search somehow? If so, please explain the filter process.
10. Did you reuse a search strategy previously described in the literature? If so, have you cited this previous source and then have you explained how you modified things since the last time the search strategy was used (e.g. changed the date parameters)?
11. Did you include the date of the last time you ran your search strategy?
12. If a substantive amount of time has passed since you ran your original search, did you find a way to update the search? (e.g. rerun the search with the time since you began the study, set email alerts for certain authors or relevant keywords?)
13. Did your search strategy undergo peer review by an expert? (e.g. a librarian)
14. Did you document your total records originally pulled from each database or other sources?
15. Did you have a process to reconcile duplicates across the databases or searched sources?

Key Takeaways

1. Literature review serves many important purposes in a scholarly project. It is essential to position the study in the field of inquiry.
2. One can leverage a variety of resources in an effective literature review, including pilot search, formal search assisted by a librarian, and expert consultation.
3. Literature reviews can be turned into works of scholarship. Review the reporting guidelines for your review for best practice.

Vignette Conclusion

A few days later Darla and Lemy logged into a video conference with one of the academic librarians. They had been sent a chapter from something called the Health Professions Education Research (HPER) manual that had helped them to clarify what they wanted to do next.

The librarian smiled at them and asked: "How can I help?"

"Well... we were wondering if you could help us with constructing a robust search strategy on our topic. We've done some pilot searching in Google Scholar, and we've found some keywords from relevant papers that we think will help us do the job in PubMed, but we're having trouble with converting things to other search engines..."

"Wow," the librarian stated, "You two really have a good start on this. Let's see what you've got?"

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About the Authors
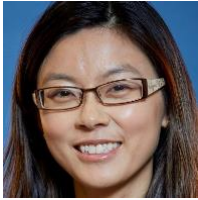
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2-2 Defining Research Objectives and Formulating Research Questions

MATT SIBBALD AND SARAH BLISSETT

Overview

Research ideas in health professions education are everywhere. What are the different approaches to curricular design? Why choose one assessment method over another? Just how does problem-based learning (PBL) work? And yet getting from an idea to a research question which will advance our understanding and add to the conversation in the health professions education is an art and a science. An art to understanding what will spark the interest of the community, and a science to know how to craft the question in a way that focuses on describing, justifying or clarifying.

Good research questions consider carefully the scope of what is being studied – too broad and hard to find meaning – too narrow and hard to apply. Good research questions often lend themselves to a methodology – or are aligned with a methodology – that is best suited to the type and manner of question being posed. Finally, good questions do not shy away from the context in which they emerged. Like distinctive characters in a movie plot, they are uncompromising in their specificity. Rather than being afraid of bias, good research questions make explicit the assumptions on which they are based and defend against misinterpretation through systematization. This chapter will introduce you to the types of research questions. We will explore how bias is inherent in all research questions, but can be mitigated. Finally, we look at how research questions help decide on methodologies, as they are most effective at advancing the conversation when the methods match or align with the question in a way that leads to clarity, discovery or novelty!

In this chapter, participants will:
1. Classify research questions into different types: descriptive, justification, clarification.
2. Hunt for bias in research questions.
   3. Broaden the perspective on pursuing a research question through collaboration.

Vignette

What a challenging first year of residency! Xyla moved to a new centre to start her internal medicine and feels that she has developed a new sense of self, and new professional identity as a result of the journey. She wonders how much the shift in cultural context contributed to her new identity formation – what a great idea for a research project. But how to get from this idea to a researchable idea? What kind of questions is she asking anyway? Is this a descriptive, justification or clarifying question? Is there relevant theory? She has experience doing survey research in the past, should she simply adapt this approach?

Deeper Dive into this Concept

Writing a concise and specific research question is well worth the effort. Coming up with a single sentence may not seem like a big endeavour, but it can be really challenging to find a question that contributes to the conversation in the literature. A great question is right where the action is at – the proximal zone of development for the field. It challenges convention but is well situated within the existing conversation. If you are in Xyla's position, and want to explore something new, make sure that you have started with understanding where the field is currently. Search the literature systematically, read carefully and thoroughly to understand the current conversations, before trying to craft your research question. For your research question to incite conversation within the field, it should build on what others have done, and highlight an

important gap in the literature which has not been previously addressed. It is important to think about gaps both theoretically and practically to be meaningful. Does repeating a study for internal residents that was already done with a wider group of residents really address a gap? It might be, especially if there is a theoretical reason to consider internal medicine residents unique, and especially if that theoretical reason is intertwined with the construct being studied. For example, the link between supervision and entrustment is well established, but when the tasks are cognitive – such as in internal medicine – what the terms direct and indirect supervision mean are less clear, but this is highly relevant for the construct of entrustment. Here the gap relates to the construct of interest and represents a meaningful rationale for exploration.

Once you have identified a gap, consider whether you can formulate a research question which will inform that gap. How will you learn something and convince others that you have learned something about that gap? Here, consider the different types of questions – are you taking a descriptive approach? A justification approach? A clarification approach? For more information on these different types of questions, read the article by Cook et al. listed in the suggested readings list (1).

Next consider the language that you are using. Words are important. It is worth spending time to carefully consider what terms you are using. Are these the dominant terms within the literature? Are these the terms most likely to help advance our understanding of the gap? Are these terms specific and focused enough to be practically researchable? Do you want to explore workplace-based assessment or entrustable professional activity assessment? The difference in terminology sets the stage for your entire research endeavour.

Then, after you have settled on the language, recognize that there is a balance between being concise and thorough – not losing a reader in a detailed, run-on research question, but being sufficiently clear to be a research question and not just an objective or aim. Many will include the context, the population and the methodology in their research question. This is similar to including the *Population*, *Intervention*, *Control* and *Outcome* present in many clinical research questions. Finally, consider whether not your research question should be divided into smaller questions, especially if you are referencing multiple methodologies or populations. Research

questions that are too broad often end up in complex methods, and results which are hard to interpret.

It is helpful to share your question with your study team and reflect on it. The following are some questions that may guide you through thinking about your research question:
- Is this answerable?
- Does this address the gap that you have highlighted in the literature?
- Is the specificity and context provided sufficient to predict the methods?
- Will this add to the conversation in the literature?
- Will it hold meaning?
- Will it have impact? (See Chapter 3-4 for more thinking around this topic.)

You can also review some of the literature on how to generate good research questions that are listed in the reference list below (2-4)

Also, please listen to the following podcast featuring Drs. Larkin Larmarche & Teresa Chan on the topic of research questions. Some of the papers mentioned in this podcast are available below.

Click on the picture above to visit our eBook website, or use this hyperlink to gain access to this podcast. https://books.macpfd.ca/HPER-Primer/?p=45#pb-interactive-content

1. In a research question, words matter. It is worth taking the time to fuss about the terms you pick.
2. Focus the question on the literature gap. Remember it should be both theoretically and practically meaningful for your intended audience.
3. Scope matters. Questions that are too broad are generally not researchable; and those that are too narrow often not relevant.
4. Don't rush – a hasty question leads to slow publication!

Vignette Conclusion

Xyla starts by deciding to read up on the literature. She realizes that there are many theoretical frameworks around professional identity. She connects with an author of a previous paper, and discusses her ideas. She opts to explore the role of cultural context in professional identity setting by studying those who train in different cultures, using transformative learning theory as a framework to help her clarification question.

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2-3 Setting and Defending your Methodological Choices

TERESA CHAN

Overview

In this Chapter, you will explore strategies for aligning and articulating your methodological choices for your audience. Whether this is for your readers or to survive peer review, it is important to articulate your perspective on **WHY** you have chosen your methodology and methods and **HOW** they are linked to your research question.

Key Points of the Chapter

By the end of this chapter the learner should be able to:
1. Identify the "throughline" between their research question, research methodology, data generation methods, and outcomes.
2. Describe why it is important to think ahead to peer review and critique of your process.
3. Develop a strategy for justifying (or defending) methodological choices and responding to peer review.

Vignette

Xiang sighed with exasperation. Days away from his thesis defense, he had just received more questions from his external examiner around his methodological choices within his master's thesis. The examiner had written notes that suggested that he needed to "substantiate" the rationale for his study design choices more. Based on his reading, he had never seen many of the sections the examiner requested within other people's papers, and yet for his thesis he was expected to have a whole chapter around methodology. He shot an email off to his supervisor, Dr. Ubuntu, who was always there for him. Dr. U always did a great job at clarifying things via a quick email or more in depth pep talk... and always gave great insights about how things fit together.

From: Xiang-Lee, Chen <chenx123@mcmasterx.ca>
Date: Thu, Aug 19, 2021 at 09:20 AM
Subject: Methodology
To: Ubuntu, Camille <ubuntuca@mcmasterx.ca>

Hi Dr. Ubuntu,
Just as an update, I've written up all of the intro, lit review, and results for my thesis, but now I'm having trouble with the methodology section.
I've found that in published papers, this section is pretty small, but Dr. Ohram is asking for a lot more detail... and I feel like I'm a bit lost about what I should put in this section.
Do you have time to chat?

Yours sincerely,
X

From: Ubuntu, Camille <ubuntuca@mcmasterx.ca>
Date: Thu, Aug 19, 2021 at 3:20 PM
Subject: Methodology
To: Xiang-Lee, Chen <chenxl23@mcmasterx.ca>

Dear Xiang:

Sounds like you've really done a great job at making headway with your writing. I am away this week on vacation, but perhaps we can meet at our standard time in the first week in September?

In the meantime, I would suggest you read the HPER chapter on Setting & Defending Your Methodological Choices (2-3) that may be useful for you to review. I have found students are often confused about these processes and the jargon associated with the methodology sections of any study. One thing I find students stumble on is in linking their methods both to their epistemology/philosophy of science, and also to their data collection and analysis methods. As for your question about where this is with published papers, this content is often interwoven throughout the methods, analysis, and discussion/limitations section.

Cheers,
Camille

After quickly booking the meeting in his calendar, Xiang clicked on the link to read with great interest.

Deeper Dive on this Concept

Setting and NOT forgetting

Whether you're a graduate student (like Xiang in our vignette) or an experienced researcher (like Camille), writing your methods can be very important for your success when making presentations or preparing a publication. Whether you are submitting a study protocol to the research ethics board for review, a grant to a competition, or a paper for peer review, the readers of your research work will want to understand why and how you decided upon your research methods and how they align to your research questions and your outcomes. They may also expect you to state your epistemic roots (e.g. state your philosophy of science and how it informs your view on the question/methods).

For those new to research, it is important that there is a logical flow between your philosophy of science & epistemology and between the research question, methodology, data generation and analysis

methods, and the outcomes of your project. We will call this the "throughline" of your paper. When a project's throughline is broken, that is a red flag for editors and reviewers – and is often what these individuals might consider a fatal flaw of the paper. As it is impossible to comment on every possible nuance involved in research alignment, we will focus on common mistakes in methodological alignment and communication.

Here are some common pitfalls that can occur with project throughlines:

1. **Conflict or misalignment between your epistemology and the research question:** There is an inextricable link between your epistemology as a scientist with the research question. One common problem can be that there is a misalignment between your view on the construction of knowledge and your research question. For instance, if you wanted to know how many people engaged in a certain faculty development activity, you probably shouldn't use a constructivist approach to base your research design – this question likely is better framed within a postpositivist lens.

2. **Contradiction between your research question and your selected theories:** It can be very confusing when trying to articulate your theory, theoretical frameworks, and conceptual frameworks, let alone link them to your research question. (You may wish to review these concepts by listening again to the MERIT podcast episode on this topic (Theory, Theoretical Frameworks, and Conceptual Frameworks). In the podcast episode, we explore how theory intersects with health professions education research and scholarship) However, it is very important to link how your specific research question is situated within all of these above frameworks.

3. **Misalignment between your research question and methods:** Similar to the above situation, when deriving your research question it is important that you ensure that your methods are properly aligned to address and/or answer your research question. If you're interested in deeply understanding the nature of someone's experience with a certain clinical learning environment, it may not make sense to use a survey full of Likert scales and "select from the below list"-type questions.

   It may make more sense for this particular research question to be more qualitative in nature, and perhaps to adopt a phenomenological approach.

4. **Lack of connection between your research question, methods, and intended outcomes:** It is important for your outcomes to be

lined up with all the components of your methods (e.g. data generation & analysis methods) as a misalignment can result in the production of data that can't answer your research question, or leading to analyses that seem disconnected from the literature gap you sought to address. Sometimes this misalignment comes when a research team gets lost in the data analysis phase. In many studies, the volume of data and plethora of possible interpretations can make it difficult to retain the original intention of the research, and results can fail to reflect the original research questions asked by the team. To prevent this, many quantitative and qualitative scholars will outline the outcomes they plan to deliver in their study protocols and grant applications. These statements can serve later as touchstones for your team. In qualitative research, in particular, study designs often evolve as the phenomenon is explored – as these changes occur, it's critical that researchers maintain focus on their research questions to avoid straying too far from their original intent.

Thinking through and managing these potential pitfalls can ensure rigorous research design and head off many issues when it comes to peer review.

Defending or justifying your choices

When a graduate student presents their project at the end of training, this session is usually called a "defense". Traditionally, this is a rite of passage that marks entry into the academy. Historically it was a public event where the other members of the academy would be invited to openly ask you questions and you would have to "defend" yourself against this public questioning. In today's world, the "defense" is not nearly as open nor so adversarial- even if others within the community are invited to attend, it's mainly to watch and rarely to ask difficult questions of the candidate. Instead, the thesis committee members and the external examiner usually aim to guide graduate students in displaying their thinking and justifying their research design and methodological choices. Likewise, when manuscripts are submitted to a journal for peer review, the conversation should be collegial; the editor and reviewers' intent should be to offer advice on how to improve the manuscript and prepare it for publication, whether or not it is accepted at that specific journal.

There is an old adage that says that the best defense is a good offense, but, in less adversarial terms, the best way to make it through peer review or a defense is to ensure that your choices are rigorous and defensible. And so, it can be quite useful for new researchers in the health professions education domain to imagine that they will need to "defend" the choices they make when designing and writing up their studies. Being articulate in prophylactically "defending" your choices can serve three main purposes:

1. **If you are writing a study protocol:** Working with your research team to articulate and justify your methodological choices (e.g. analysis plan, data collection choices, etc.) can help to align your research and your team, getting everyone on the same page. This will help your team focus on the big picture and maintain the project throughline even when drowning in data or making sense out of analyses.

2. **If you are intending to submit a grant application**: Clear purpose and methodological alignment is one of the key factors that grant reviewers look for, and reviewers often heavily scrutinize the methods section. The merits of your science are often driven by the project logic, and so being thoughtful about why and how you selected your methods will help a grant reviewer better buy into your intended plan.

3. **If you are writing your paper:** Being transparent about your methodological choices will strengthen your methods sections and demonstrate the rigour of your work for editors and reviewers, since you will not be leaving your readers to guess at your intentions. Instead, plainly listing your intentions may provide a refreshing amount of clarity that will make your paper stand out.

For more on this topic, please consider listening to the listed podcast within the HPER curriculum:
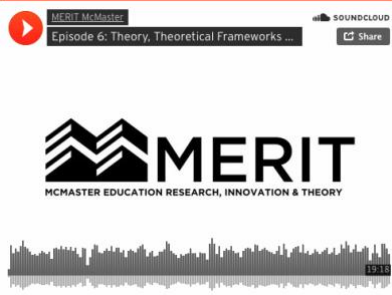
1. *Defending your Methods*

In this podcast you will explore the ways in which you may need to message and explain your methodological choices. In this episode, Drs. Sandra Monteiro & Teresa Chan discuss the ways in which you might explain and/or defend your methodological choices.

A SoundCloud element has been excluded from this version of the text. You can view it online here: https://books.macpfd.ca/HPER-Primer/?p=53

2.   *Theory, Theoretical Frameworks, and Conceptual Frameworks*

In this podcast you will explore how theory intersects with health professions education research and scholarship. Drs. Teresa Chan and Lara Varpio take you through these concepts together.

A SoundCloud element has been excluded from this version of the text. You can view it online here: https://books.macpfd.ca/HPER-Primer/?p=53

- **Ensure you have a solid throughline between your research question, methodology, data collection/generation and analysis methods, and outcomes** – The project throughline is the most important aspect to bear in mind when designing and then conducting your study. You must ensure that each of these concepts is linked logically. Failure to do so will result in a misalignment which can be a red flag for readers, editors, and reviewers.

- **Ensure that your epistemic roots are clear and align with your methods** – Often epistemology is implicit rather than explicit in methods sections. In your study protocols and/or methods sections of a paper it can be useful to state your project's intended epistemology and theoretical or conceptual assumptions outright. This can help guide readers (as well as reviewers and editors) in interpreting your manuscript and allow you to clearly articulate how your assumptions inform your research and align with the choices you've made.

Vignette Conclusion

Xiang spends a lot of time reviewing the HPER resources and combing through academic articles to find ways to articulate his methods. He comes across O'Brien et al.'s Standards for Reporting Qualitative Research (1), which he finds extremely helpful in determining the level and type of detail he should include to instill confidence in the rigour of his work and satisfy his external reviewer. He realizes that many of the manuscripts he's come across likely do not provide sufficient detail on their methods. But he's still struggling with this question of alignment – how would he know if his project doesn't have a clear "throughline"? One of his colleagues recommends Varpio et al, (2017) and he realizes that some of the language he has used to describe his methods (such as strategies to eliminate bias and member checking to confirm the 'truth' of each participant's story) were more in keeping with post-positivist paradigms that he learned about in the HPER primer and didn't really jive with his constructivist paradigm and choice of constructivist grounded theory as a methodology. He begins to revise his methodology chapter with an eye to ensuring that his decisions reflect the constructivist paradigm his study is rooted in.

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UNIT 3:
SHARING YOUR PROJECT

Unit 3 challenges one's academic and literary skills and provides the foundation to create a strong and compelling research proposal. The topics included in Unit 3 cover the articulation of an introduction, methods, and discussion sections, and also examine the impact of rhetoric in the potential impact of research.

3-1 Getting Started on Writing

TERESA CHAN AND SANDRA MONTEIRO

Overview

Writing can be a challenge for any scholar: #TheStruggleIsReal. One need only look at the Twitter hashtag #AcWri to see a whole community that struggles openly together.

Remember that what you see in the end within fully published papers is not what comes out of a writer's mind or fingertips. A published manuscript has been through multiple authors, reviewers, editors, copy editors, and layout artists.

In this chapter, we will review some practical strategies for getting started on your writing, and hopefully overcoming writer's block.

Key Points of the Chapter

By the end of this chapter the learner should be able to:
1. Identify professional and personal barriers to writing.
2. Describe the strategy of joining the conversation.
3. Explore the costs and benefits of several habits of writing.

Vignette

"Wow, Samra... that was an amazing presentation today," remarked Dr. Molly Anders-Wong. *"I am so proud of you! You did a great job presenting on behalf of the team. I took a pile of pictures so you can pick the best one and we can send it out to everyone in an email."*

"Thanks doc!" Samra beamed. *She had received really good feedback from the community of health professions educators who had been there to see her oral presentation. It felt good to have such a great reception for her team's work.* *"One of the audience members was asking us if we were going to publish a paper sometime soon."*

"Yes! That was me!" *yelled a voice from across the room. They looked over and saw Dr. Jaime Letourneau, a prominent scholar in their field and the Editor-in-Chief of one of the key journals within health professions education.*

Molly looked a bit stunned as Dr. Letourneau approached them.

"Oh!" *Molly muttered, as her face turned beet red.* *"Th...th...thankyou for inquiring Dr. Letourneau. Did you have any specific feedback that would be helpful to us?"*

Dr. Letourneau went on to monologue about the pros and cons of the research work, stressing several important points she thought Molly and Samra could weave into the story of their paper. Molly was quickly jotting down notes as fast as she could write. It was not often that one of the most prominent scholars in your field spontaneously gave you advice on your manuscript. Samra smiled as she still found it very endearing that Dr. Anders-Wong seemed to constantly be shocked that others were excited about her work. *'Imposter syndrome,'* *Samra thought to herself,* *'... is certainly a real phenomenon if Dr. Anders-Wong feels it still!"*

"Alright then," *Letourneau glanced at the clock,* *"I must jet to another session. My postdoc is presenting our work and I have to be in the audience to support him."*

"Thank… thank you so much for your feedback," stuttered Molly as she bowed and waved, and nervously watched as Dr. Letourneau bolted quickly out of the room.

Samra looked at Molly. Molly looked back at Samra. This was an exciting turn of events. Quietly, Molly wondered to herself: 'I wonder what it takes to write this paper up? I don't even know where to start!'

A Deeper Dive into this Concept

The above vignette demonstrates the link between an abstract presentation at a conference and the realities of publishing. The link is tenuous at best, since many scholars fail to publish their conference abstracts as papers. If you are prepared like Samra and Molly were to take a conference presentation and parlay the feedback into your manuscript, then this can be very helpful!

Unfortunately, what Samra and Molly have done is certainly not the most common case. In fact, studies have reported that less than 50% of abstracts at clinical or health professions education conferences end up being published (1-5).

The Struggle is REAL

As we stated in the abstract, the struggle **is** real. Even the most prominent scholars in our field have historically found writing difficult. There are a number of tips and tricks, however, that we would like to share with you that may be helpful. First we review potential barriers to writing and guide you through some reflections that can help you identify which barriers are most relevant to you. Then we present some strategies for creating structure and productive habits in your writing process.

What barriers are in your way?

There are a number of barriers that can prevent authors from writing efficiently. Below are some exercises that can help you to explore your own writing habits and hang-ups.

Before we identify some common barriers, take some time to identify some factors that contribute to delays in your own writing. Think of how you would answer the following questions:

1. Can you recall a manuscript that was very easy to write? Was there another that was very challenging? What do you think made the difference?
2. Do you assign dedicated time to write? Are these times when your cognitive energy is lower? Or when you feel optimal?
3. When you focus on writing, is the task too big? Are you always the sole author or are you ignoring the potential help from co-authors?

Take some time to write answers to these questions and revisit them, identifying potential solutions as you read through.

Writing is a skill like any other and requires practice and feedback. Some manuscripts, just like some aspects of a skill, will be far easier than others. This is normal – the ease of a manuscript can be facilitated by deadlines, while the difficulty of a manuscript can be heightened by the complexity of the topic. Writing also takes focus and cognitive effort – if you are only focusing on writing at the end of a long day you may be creating extra challenges for yourself. Maybe you are prone to dedicating an entire day to writing, potentially creating unreasonable expectations for yourself. With the appropriate structure, it is possible to take on writing in smaller pieces. Additionally, remember that the labour of writing should be distributed amongst all co-authors – they're not just there for a final review of the paper prior to submission. The ICMJE guidelines dictate that eligible co-authors must contribute significantly to the concept of the paper and the writing (6). If you are convinced that you should always be first author, but are struggling to write, consider contributing smaller sections as a co-author and build momentum for your own work.

Common Barriers

Barriers to focusing on the practice of writing can arise from personal or professional factors. Personal factors may include a healthy dose of imposter syndrome (like Molly in the vignette!), perfectionist tendencies, and hang ups you have about your own writing. For instance, if you don't think your writing is any good, it makes it more difficult to engage in the skill. As with any skill it helps to seek out coaching or feedback from colleagues. Try to seek advice from co-authors and mentors as you practice this skill.

Professional barriers in writing include competing interests and jobs. For many educators, we must juggle our students, administrative meetings, teaching, and marking! For those who are clinicians as well, then you may need to fold in your clinical schedule as well. Consider also if you protect your writing time: the unpredictability of schedules, the drama of last-minute deadlines for grants, the emails that are urgent-to-them-but-not-to-you... all of these interrupt our writing time and make it difficult to become immersed in a story. All academic writing is a story, and like any good story there are key and required elements that will contribute to the success of the story. Attending to these elements can create structure on a previously blank page and can help overcome some of the personal barriers identified above.

The table (3.1.1) below offers solutions to commonly reported writing challenges. Try out one solution at a time and commit to sticking with it for a few weeks. After some time, consider either trying another strategy or adding another one. Over time you will discover the strategies that work best for you.

Table 3.1.1: Problems and Solutions to Common Challenges for Writers

Common Problems	Mindset	Habits	Structure
'I don't have enough time'	First set some expectations around how much writing is possible.	Get in the habit of using your calendar to your advantage - put in writing time slots. Assign priority and deadlines to writing tasks so that you're not focusing on too many at once.	Create structure by seeking out grants and career awards that can offer motivation to write to a deadline. For clinicians, these can also help support dedicated time to focus on scholarship.

'Everything around me needs to be just right'	Face your tendencies for perfection and identify small, achievable goals	Consider the timing of the day - some people report being more creative and productive in the morning while for others the best time is the afternoon. Timing may not be relevant to you, but it is worth figuring out. If there are kids at home, create home routines that let everyone know that independent homework time is also your writing time.	Create structure using a quiet space that is ideal for writing, with a comfortable chair and desk. Create a dedicated writing space at the office or at home; create an understanding with kids (if old enough), define your own expectations around how much writing you can do.
'I cannot write alone'	Maybe this really means you cannot write when it's too quiet? Experiment with writing alone accompanied by background music.	Use social media to connect with like-minded individuals. Reach out to people in your network - others struggle with writing too.	Create structure and accountability buy booking time to connect (or even Zoom) & write with a colleague.
'I am not a good writer'	Writing is a skill like any other and requires constant practice - if you're feeling the sting of reviewers' recent comments or rejection, try to focus on the constructive side and integrate their feedback into your next paper.	Employ the assistance of a writing coach or mentor - some objective feedback may help change your perspective. Keep a notebook nearby to capture ideas and researchable questions that can build your literature review.	Create a positive outlook by celebrating your writing successes and remind yourself of your writing strengths. This is the one time you may want to be completely unstructured and write freely - knowing it is your worst, first draft. You will review and edit it yourself at a later date - but at least it won't be a blank page.

Strategies for creating structure on a 'blank page'

The following are hard-learned tips for getting started on your writing for your paper.

Don't just imagine joining a conversation – have one!

We are big fans of Dr. Lingard's concept: *the problem-gap-hook heuristic* (7-8), but booking time to discuss your study findings with your advisor or co-authors can be very helpful for getting your writing started. If you are using Zoom, you can even turn on auto-transcription and then actually record your conversation (and then have it magically transcribed) so you can use the transcript as a starting point for your draft. Some authors also use the built-in speech-to-text dictation capabilities of word processor programs such as *Microsoft Word* or *Google Docs*.

Create a storyboard for your paper

Just like animators at Disney or Pixar studios, it can be useful to assemble your notes into an outline via a "storyboard". After all, in these animated features, usually thousands of artists come together to make a singular story flow. As such, having a clear outline with your arguments laid out, and the story arc defined, can help your authorship team to create a shared mental model of your paper. Engaging in this process first can make it more transparent how authors can be involved in shaping the story line, give feedback, add citations, and then bring their intellectual contributions to the table. Ultimately, having processes can allow for more equity in authorship and involvement of more thoughts and voices.

How to storyboard:

We have three key steps that may help you create a storyboard.
1. **Brainstorm:** Write down your key ideas and make them separate lines or objects (You can do this linearly in a share document, or if you are more visually oriented, you can use real stickie notes or with virtual tools like miro.com or Google Jamboard)
2. **Sequencing:** Arrange your key ideas into a logical sequencing that tells a singular story. Sometimes you may have so much data

that there can be more than one storylines that appear during this process. At this point, you and your team should consider whether you have more than one paper in reality. Turn this set of logical statements into a shared document for all in the team to review. Remember, this is an OUTLINE – do not write sentences – just express your ideas and concepts enough so that others can follow your logic.

3. **Refinement:** Have your team all take turns vetting the story as a first pass. Use interactive tools like comment boxes to leave notes to each other Let them add their ideas and thoughts to the outline. Then have your team take another pass to add their citations and address questions ideas.

Integrate templates into your writing

For many authors, staring at a blinking cursor on a blank screen is one of the least inspiring things in the world. Talk about a recipe for writer's block! The solution that we have developed has been to simply create templates for the types of writing you should do – so that you never have to start with a truly blank page!

Most papers will follow a similar structure so use those structured headings to your advantage – go so far as to identify the target journal and use their required headings to structure your paper. If you would like to develop templates, here is a paper template that one of our MERIT postdoctoral fellows created.

Generally speaking, there are four core documents that all scientists can consider creating as a template.

1. The Study Protocol template – This helps you to scaffold your initial study design plan and should contain all the headings and material that your research ethics board or institutional review board will need when they review your study.
2. The Research Manuscript template – Template for basic research article with the IMRAD formatting can be very helpful in this way.
3. A template for non-research article (e.g. commentary) – These articles tend to avoid standard headings, but still can benefit from some structure.
4. Cover letter (with all the niceties)
5. One for original submission
6. One for R&R with revision table

7. Optionally, you could consider creating a visual abstract template – for you to generate some buzz around your published paper, have a template that gets you to consider creating a 3-panel infographic (i.e. visual abstract) that will help people understand your study at a glance and want to review more (See the following website:
   https://www.surgeryredesign.com/resources)

As many journals have inconsistent requirements for submission, it may also be prudent to have multiple versions of the aforementioned templates – one for each journal that you tend to submit to most often!

Read more to write better

There are a number of peer-reviewed publications that offer tips for effective writing, such as this open-access paper by Gottlieb et al. (2018) (9).

As Dr. Lara Varpio (Adjunct MERIT scientist) highlights in a HPER podcast with Dr. Teresa Chan, reading is very important for helping you to improve your writing. By reading the articles of a similar type (or "genre") within your favourite journals, you will get a sense of what the journal editors prefer. We suggest you profile several papers from the TYPE of article you'd like to write and then consider using one that you really liked to reverse engineer your paper a bit. Bonus point: If you eventually find yourself able to engage in peer reviewing and editing others' work, this will improve your writing even more. Learning what works and doesn't work by reviewing the work of others is far easier than suffering the slings and arrows via your own reviews!

Key Takeaways

In summary if you struggle to get started on your writing, take time to:

- **Rethink your mindset** – You will get better, but you'll always struggle to get better. Reflect on the potential barriers to your writing – maybe you are hanging on to old assumptions and old habits
- **Create new habits** – Just as you have created habits for teaching, leading a meeting or answering emails, spend time to create a habit to write. Habits can take time to form, so keep at it.
- **Build a structure** – Create opportunities for writing, timelines to create accountability and new attitudes to encourage your motivation.

Vignette Conclusion

Molly stared for a while at Samra, who smiled and waved at Molly to nudge her out of her trance.

"Earth to Molly!" Samra chuckled. "Penny for your thoughts?"

"Oh... I was... Well... I just was thinking that maybe... this means we should write the project up?" asked Molly, still a bit starstruck by the whole encounter.

"Yes, good thing I'm 90% done. I've been writing all along the way! That chapter in the HPER was very helpful to get me started. I'll just add the finer points you just took down from our conversation with Dr. Letourneau..."

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3-2 Writing a Methods Section

MEREDITH VANSTONE AND LAWRENCE GRIERSON

Overview

When writing papers, one of the first sections that many authors seek to tackle is the methods section. Since these are often quite similar to your study protocol and grant proposal, they can be a great place to start for authors who find writing daunting.

Key Points of the Chapter

By the end of this chapter the learner should be able to:
- Articulate the key components of a good methods section for quantitative research paper
- Articulate the key components of a good methods section for qualitative research paper
- Access relevant reporting guidelines for various forms of research papers

Vignette

Anuja is a nursing student who has been working hard on a project about observing students engaged in an interprofessional activity. The team involves several more senior educators and professionals. As Anuja's supervisor you know that she has done a really good job at pulling the team together and helping with a number of data collection tasks. However, to meet ICMJE criteria for authorship, you are mindful that Anuja should be engaged in the drafting of the manuscript if possible. You decide that Anuja should be able to work through the methods section of the paper. You are able to find the study protocol document for this project and forward that to her. In your email you write:

From: My Email <you@mcmasterx.ca>
Date: Thu, Dec 12, 2021 at 1:20 PM
Subject: Study Protocol
To: Singh, Anuja <singha25@mcmasterx.ca>

Hi Anuja:

Here is the study protocol I was talking about at our last meeting. I am hoping you can be in charge of writing up the methods section of our paper. Do you mind taking a look at the study protocol and then translating over to the methods section in the manuscript Google Doc? Thank you!

Anuja replies:

From: Singh, Anuja <singha25@mcmasterx.ca>
Date: Thu, Dec 12, 2021 at 1:20 PM
Subject: RE: Study Protocol
To: My Email <you@mcmasterx.ca>

Hi there:
Thank you for the template – that is very helpful. However, I am a bit confused about the methods. Seems we had both quantitative and qualitative methods within our project. Are there any reporting guidelines or resources you can suggest to

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help me write these sections up? I'll admit I am not an expert, but it seems the methods don't contain everything that I've seen in other papers I've read so far.

Anuja

You ponder Anuja's request and wonder... Are there more resources you could use to assist her in this area?

Deeper Dive into this Concept

The methods section is a critically important part of any research paper. While we are often most interested in the results of a study, the details provided in the methods provide us the information we need to appraise the analytic interpretations presented by the researcher and in the case of some forms of research, to replicate the research for the purposes of confirming or refuting the validity of their observations. A high-quality methods section also serves to convince those who fund research that you have a comprehensive and manageable plan for addressing your research objectives.

Every methods section has some key components. We have structured this brief to include some of key headings you may wish to incorporate in your methods section, with an explanation of the type of information that may be found in each section. We also recommend that you consult the research methods reporting guidelines relevant to the type of study you are conducting. These guidelines provide very detailed information about the methodological information which should be reported and can be useful when you design a study, as they will alert you to elements that should be considered. The EQUATOR Network has compiled a searchable database of health research reporting guidelines (1). Journals will often also provide guidance on the type of information they wish to see included in a methods section.

Study Design
The methods section of either a qualitative or quantitative research project should begin with a description of the study design and research methodology. Note, it is important not confuse the

methods, with the methodology. The methods are the behaviours, tools, and techniques that are used to complete the study, while the methodology describes the systematic approach to collecting and appraising research data.

In this regard, it is essential to name a particular methodology alongside a description of the study design. The study design is often expressed in technical terms (e.g., retrospective observational design; a sequential (QUANT > qual) mixed methods design) while also providing more specific details in your initial description (e.g., longitudinal workplace observation with interviews after particular professional milestones). In qualitative research, methodologies include phenomenology, grounded theory, and qualitative description, amongst many others. In quantitative research, methodologies are either descriptive, correlational, causal comparative, quasi-experimental, or experimental.

Qualitative researchers will also often include a statement about their philosophical assumptions (e.g., constructivist, post-positivist, pragmatic) in this section. Where there is an unconventional match between methodology, study design, and philosophy, a justification and explanation of congruency is essential. This is not something that is typical in presentations of quantitative research but it's not a bad idea to include statements of philosophical assumptions in this type of work too. Ultimately, this section also provides the researcher an opportunity to express why that design and methodology was chosen. This information serves to demonstrate that well thought out methodological decisions have been made.

Participants

For research studies involving human participants, the methods section must describe the participants in the study. It should define the population or populations that the participants represent and provide information about what type of participants were eligible for inclusion.

Sampling and Recruitment

Research that includes humans also needs to explain how the sample of participants was determined and indicate details about how they were recruited for the study. Details about the participants include the number of participants, their assignment to

any relevant group, and, when available, a synopsis of relevant personal characteristics such as their self-reported genders, their age expressed in mean and range terms, and any other features of relevance to the research study.

The sampling and recruitment section will include a description of the type of sampling strategies used. Sometimes more than one sampling strategy is used. For example, a qualitative methods section might describe the movement from convenience to theoretical sampling. It is common to provide examples of the purposeful aspects of sampling (e.g. by age, professional designation, gender) and the criteria for inclusion and exclusion, rather than just stating that participants were purposefully sampled. This section will also provide details on how each sampling strategy was operationalized.

Details about determining the size of samples can look very different in qualitative and quantitative studies. Sample size in qualitative research is a function of data sufficiency, so this section will also often include information on how the researchers define data sufficiency (typically with reference to their particular methodology) and how they operationalized data sufficiency within the study. In quantitative research, the appropriate sample size is determined as a function of three factors – the significance level (i.e., the probability of the study rejecting the null hypothesis), the power level (i.e., the probability that the statistical test correctly rejects the null hypothesis), and the estimated effect size (i.e., the magnitude of the experimental effect). The researcher must make decisions about each of these factors. With these determined, researchers can refer to a textbook or an online calculator to determine the sample size. The methods section should offer detail about these factors and the system (e.g., online calculator) used to make the calculation.

Research Ethics

The methods section is also where a researcher will make a declaration that the protocol has received approval from a relevant research ethics board and that individuals who chose to participate in the study did so following the necessary informed consent processes. For more information on the research ethics process see

(2).

If ethical issues were identified in the design or conduct of the research, it is good practice for the researchers to describe those issues and what steps were taken to mitigate the chance that harm may come to participants. However, this is not a standard component of methods sections, it is typically only included when something about the nature of the study may raise ethical concerns. For example, many health professional education research studies take place at a single site, with faculty acting as a researchers and students as research participants. The research ethics section provides an opportunity to describe what actions were taken to identify and mitigate the effects of this power imbalance, including not allowing research team members with a student assessment role access to information which may reveal participant identities, for instance. You can read more about navigating ethics in .

Data Collection and Analysis

Perhaps the most obvious or intuitive part of a methods section is that which describes the specific methods used to collect and analyze data. This component is usually the longest part of the methods section, highlighting the specific procedures, techniques, and/or activities that are involved in the study. While word count is often a concern for journals, this section can in and of itself never be too detailed. It should describe the materials or tools that were used and how they were prepared or developed. It should indicate the exact order of events within a research protocol and, depending on the research approach, highlight any experimental controls or procedures undertaken to reduce researcher subjectivity. Where relevant, this portion of the methods may denote the temporal length of each participant's involvement and/or the whole study. All methods sections must explain how the collected data were analyzed for results and how these results are interpreted in support of the research objectives.

For qualitative research studies it is essential to describe what data collection tools (e.g., interview guide, field notes) were used, by whom, and how they were developed. Often these are included as online appendices to the paper. When participants are involved in different types of research activities (e.g., observation and

interviews) the selection of participant for each type of activity should be detailed.

In both data collection and analysis, qualitative researchers can lean on the conventions of the methodology they identified earlier, describing briefly that conventional procedures such as iteration between data collection and analysis, constant comparative analysis, or data condensation were performed. Instead of defining these well-known terms, concentrate on providing information about how these techniques were operationalized in the study.

Descriptions of qualitative analysis should name the techniques used, describe whether they were inductive, deductive, or moved between modes, and name who performed each technique and what the roles of the other researchers were. Often coding is operationalized by a small group of researchers, with the larger team providing feedback and insight in different ways. It is essential to describe the nuances of this analytic involvement.

For quantitative research studies, those involving the collection and manipulation of numerical data, there are some special features that should be attended to in the methods section.

It should highlight the processes of data collection. The researcher should explain the nature of the collected data, how the measurements were made, and whether it was subjected to any transformations prior to analysis. This may include highlighting whether the data are continuous, ordinal, nominal, or categorical; describing the tools that were used or the databases that were searched to extract the data; and whether or not you are expressing the data in mean, total, percentage, or raw forms in support of the comparisons you wish to make.

It also must describe the statistical tests that were performed to analyze the data. The description of statistical tests is often organized with direct relevance to the researchers' various hypotheses and ensures that post hoc analyses and mathematical corrections are described alongside all primary analyses. Essentially, any analysis that is done in support of the interpretations needs to appear in a dedicated section for data analysis.

Reflexivity

In qualitative research projects it is customary to include a statement about the perspectives of the research team as relevant to the research project. These types of statements will vary depending on the topic of the research and the relationship between the researchers and the topic or participants. There is no set guidance for what to include or not to include in a reflexivity statement. Often it includes a description of professional roles, social identities, personal or academic experiences of the research team as relevant to the project. For example, in Dr. Vanstone's research about pregnancy and parenthood, she often described that she is a mother, but this is not (typically) relevant to her medical education research so would not be included in the reflexivity section of those studies. Sometimes reflexive identities are ascribed to individual researchers, sometimes the composition of the team is described in aggregate, such as in the following example from a study about the admissions experiences of aspiring physicians from low-income backgrounds:

> *"Our team represents a range of identities relevant to the inquiry. While we all identify as women, we represent several groups who are under-represented in medicine, including low-income backgrounds. Several, but not all of us, have aspired to medicine, with different results. Our team included a current undergraduate student (RB), a current medical student (RK) and a physician-educator (MM). Two of us have been involved in making and enacting MD Admissions policy (MV, MM)."* (Quote from De Freitas et al, 2021 in Medical Education) (3).

Sometimes these statements also include descriptions of how the research team worked towards the goal of being reflexive researchers such as how they recorded and shared their reflexive insights and worked to be transparent about how their positioning affected their analytic work.

Other Important Considerations

It is becoming increasingly common for research studies to provide information about the deposit and accessibility of datasets that were used to create research outcomes. The process of stating where and how another researcher may access your data serves to support replications and transparency in research reporting.

Notably, not all quantitative data should be accessible. Researchers should be mindful about the deposit of sensitive data that could be linked to or that could impede the autonomy of the participants who contributed it.

More and more frequently, patients are engaged in health research. If your project included a patient or caregiver team member, your engagement practices should be described in the methods section. The GRIPP2 reporting guidelines provide guidance on how to describe this type of engagement (4).

Key Takeaways

- The methods section should contain all the information that would be needed to replicate your research. This means making sure that your methods section is comprehensive and full of detail. This also means making sure that your scientific writing is clear and cogent.
- The methods section is not the place in your paper for rhetorical flourish; it is where you lay out a precise description of what was done and the rationale for why it was done that way.
  - You may wish to use reporting guidelines to scaffold your writing. Every methods section has some key components and these reporting guidelines can help you to find out what they are. Check out the searchable database found at the EQUATOR network website (https://www.equator-network.org/) to find a relevant guideline.

Vignette Conclusion

After discovering the HPER primer chapter on "Writing a Methods Section" you send this resource to Anuja and then suggest that you meet again next week. By that time, you imagine that she might have a good first draft of the methods that you could edit.

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3-3 The Anatomy of a Discussion

SARAH BLISSETT AND MATT SIBBALD

Overview

The discussion section of the manuscript is the last chapter of your study's story: a strong finish is essential. The discussion section explores the "so what" of the story. The discussion section requires attention to achieve its many goals. The content of a discussion section should extend beyond restating the findings of the study. It should relate findings to other literature, highlight practical and theoretical relevance of the findings and outline limitations. The discussion also needs to be cohesive with the other sections of the manuscript- from vocabulary used to concepts described. This chapter will introduce you to a few approaches to writing a discussion section, review what content readers will expect in a good discussion, and some processes to ensure the discussion meets its potential.

Key Points of the Chapter

In this chapter, participants will be able to:

- Outline possible storylines: coming full circle, deep exploration, surprise insight.
- Recognize expected components in a discussion section: summarize findings, compare to other studies, outline practical and theoretical relevance of the findings, describe limitations, and suggest future directions.
- Articulate various writing processes to ensure the discussion meets it potential.

Vignette

Dakota has just received an email from his supervisor to schedule a time to plan the discussion section of his manuscript. His supervisor has asked him to think about how they will complete the story they started in the introduction. The email also emphasized how a common criticism from reviewers is that the findings are "underdiscussed" in the discussion. He isn't sure how to prepare for this meeting... he hasn't written a discussion for a manuscript intended for a health professions education audience before. Where should he begin? How does he tell a story in a scientific paper?

Deeper Dive into this Concept

Components of the discussion

The expected components of a discussion section intended for a health professions education audience include: summarizing results, comparing to prior literature, emphasizing practical or theoretical relevance, reflecting on limitations and highlighting future research. While there are recognized expected components, the discussion section should not take on a formulaic or tick-box type approach to including these components. Some practical tips are summarized below. When summarizing results, consider those that are most important for the reader to put your study in context. In comparing to other literature, consider explaining why your results are the same or different. Are there differences in the population studied or the methods applied?

The practical and theoretical relevance are important. Consider the potential types of readers and how it might be relevant to them: how would the findings relate to trainees, clinical teachers, educational researchers? Furthermore, reflect on your findings and their relevance to ensure that the findings are not overstated or applied too broadly. Consider taking a reflective stance when writing the limitations. While it is tempting to list limitations or dismiss them, the limitations section can be strengthened by reflecting how the limitations may have shaped your findings (1). For example, consider a survey-based study where participants were predominantly physicians working in academic institutions. Rather than stating that community-based physicians were underrepresented or

dismissing the limitation (e.g. the topic is of less relevance to community based physicians), authors could explain how the underrepresentation of community based physicians could have changed the results. When highlighting future research, it goes without saying that further research is always needed! Providing specifics about the further studies can strengthen the impact of this component. For example, one might ask: What novel findings were identified that need further study? What populations could be further studied?

Styles of discussion sections

Discussions that go beyond summarizing results make more impact. But how can this be accomplished? Lorelei Lingard provides helpful strategies to improve how discussion sections are written (1). She emphasizes the importance of telling a story that links the introduction and discussion. Three potential storylines could evolve: coming full circle, deep exploration and surprise insights.

In a coming full circle storyline, no new concepts are presented in the discussion. This storyline is well suited for well defined research questions. No new keywords or references are expected in the discussion.

In a deep exploration storyline, the discussion focuses on a subset of ideas that were introduced in the introduction. New concepts may be incorporated to further explore the main ideas that are elaborated in the discussion. New keywords and references will be present in the discussion. It aligns with broad research questions in health professions research. In a surprise insight storyline, there is a new concept introduced in the discussion that was not present in the introduction. Many new references will be expected in the discussion. Importantly, the surprise insight represents a new concept rather than a surprising result. If incorporating this storyline, the authors should consider deliberate signposting to orient the reader to this new concept, e.g. this unexpected or provocative explanation for our findings. Authors should also consider how the intended journal for submission will perceive this storyline, as it is not commonly used.

Writing processes to ensure the discussion meets it potential

Writers should deliberately consider the storyline and concepts they plan to incorporate into their discussion prior to writing. Meeting with the research team prior to writing to develop an outline can be effective in deciding on the storyline and concepts that will be incorporated into the discussion. This team-thinking approach to test out storylines and concepts can strengthen the outline before significant time is invested in writing.

Another strategy is to present the preliminary outline to a larger research group as a work in progress to elicit feedback.

Key Takeaways

- **The discussion section is different from the results –** The findings are presented in the results. The discussion puts the results into context: What results are important? How do they fit within what's known about the topic? How do they advance the field?

- **The discussion more than summarizes your study –** Incorporating a storyline that connects the introduction to the discussion will make a more impactful paper.

- **Appreciation of the nuance and complexity will strengthen the discussion –** A strong discussion will take time to outline and to write, with attention to elaborate on the context in which the results have meaning. It will situate your story within the larger field of research in this domain.

- **Consider different perspectives –** When discussing key findings and relevance, consider how the story will be interpreted from different types of readers of the journal: trainees, teachers and educational scientists

- **Test the waters with your story before submission –** Seek feedback on the relevance and appropriateness of your points throughout the writing process

Vignette Conclusion

Dakota sees the invitation to meet with his supervisor about the discussion section as more than scheduling some time. He decides to reflect on the storyline he thinks would fit best with the study and the intended journal. Additionally, he drafts an outline of the expected content of the discussion to review with his supervisor. He deliberately focuses on a reflective stance for the limitations. He plans to ask his supervisor if they can present their intended storyline to the rest of the research group to vet the ideas.

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3-4 Explaining your Potential Impact

SARRAH LAL AND TERESA CHAN

Overview

Have you ever tried to explain your work to someone outside of your field and been met with a blank stare? Perhaps even worse – a shrug? Sure, we can say that the interpretation of impact is highly subjective. "They just don't understand", we can say. But what if we could increase the effectiveness of our communication efforts to achieve broader understanding of our work, even outside of academia?

As researchers, it is our responsibility to ensure that new knowledge is created and then mobilized to create tangible value. Let's spend some time to think beyond research publications that are only read by individuals in our fields. Let's unlock the full impact potential of your work by reaching new audiences. In this chapter we will explore the use of social media, technology transfer, nonacademic publications, videos, and infographics to level-up our research efforts. By the end of this chapter, you will better understand your audience(s), types of knowledge mobilization efforts, and how to measure the effectiveness of your impact generating efforts.

Key Points of the Chapter

By the end of this chapter, you will:
- Identify & articulate your target audience(s).
- Categorize types of knowledge mobilization techniques (social media, academic or non-academic publication, technology transfer, videos, infographics, etc.) and

compare/contrast their potential impact for different audiences.
- Use associative thinking to identify audiences that may benefit, directly or indirectly, from your research.
- Describe how to find relevant comparators.
- Develop a plan for measuring impact from knowledge mobilization efforts.

Vignette

Nkosa stared at her grant proposal feedback from last year. She had been ranked 5 out of 11 grants submitted last year for a local education grant. The chair had encouraged her to consider revising and resubmitting for this year's competition, highlighting that her team had just placed a few points lower than the three top ranked projects. Dr. Jeong had hinted that perhaps if she could strengthen their impact statement and really focus on making the project more relevant to the frontline faculty members that their team might be more successful this year.

Upon reviewing the grant feedback, Nkosa noted that Reviewer 2 for her grant had really given her a hard time about her impact statement. This reviewer's comment had been copied-and-pasted directly into the grant feedback (completely unfiltered), and the statement was straight out of the academic meme:

> *"Quite frankly, I don't understand the relevance of this project. As a frontline clinician educator, I think that this project is far too academic and is completely divorced from the realities of medical education on the frontlines."*

Wincing as she read this again, Nkosa sighed. How was she going to take this feedback and reframe her grant this year?

Deeper Dive into this Concept

When doing research, it is important to explain the impact you think you research would have. In both granting and writing (1), the two most important questions you must answer as a researcher are:
1. So What?
2. Who Cares?

Getting to the core of these two statements are crucially important for determining how you will get your research to go beyond simply being a paper that is published, but never read or used.

We suggest that there are 4 key steps to being able to articulate the impact of your research to your readers. Whether you are creating a research proposal, grant, study protocol, or manuscript, these four steps can be super valuable to you:

Step 1: Determine and articulate your audience

Step 2: Map out all of your stakeholders

Step 3: Identify how your stakeholders will use the new knowledge generated by your project

Step 4: Find some role models

Step 1: Determine and articulate your audience

Considering who will care about your research findings is certainly a great first step for thinking through the impact of your work. There are numerous strategies that one can use to engage in the elaborative thinking that it takes to analyze all the angles. Here is an activity that might get you started in thinking about who your audience might eventually be:

Exercise: 99 Use Cases

This activity is best done as a group activity, so gather up your co-authors and give it a try! It is derivative of an exercise that they sometimes use in business schools to facilitate brainstorming around new business models. With your research team, try to generate 99 uses for the findings of your study (whether they are just hypotheses now or actual results). 99 uses sounds like a lot, we know, and likely you will find it difficult to get started – but try not to restrict yourself and let your creativity flow.

Think about big uses (systems wide) and smaller uses (in a 1:1 encounter between teacher and student). Think about how groups of individuals might use your knowledge. At the end of your brainstorming session, look across the 99 use cases and try to identify the people that were at the centre of these uses. This will be your knowledge user list, and they are certainly a key target audience for your messaging and writing going forward.

Step 2: Map out all your stakeholders

Once you have a master list of all the possible audience members, now it's time to think through how these stakeholders might interact with each other, and how they might have shared needs.

Step 3: Identify how your stakeholders will use the new knowledge generated by your project

This step will help you answer the "So What?" question that was asked earlier. Use the stakeholder list you've generated to think through the following set of questions:
1. What will people do differently if they know about your project?
2. How could you convince them to change their actions?

What will be the benefit to them if they change their practice? One hint for how you can think through these questions would be to find people who your potential stakeholders or audience members are and ask them! Some scientists even write budget line items to engage in focus groups with knowledge users and stakeholders to better understand how these individuals will use their new scientific findings or work. If you don't have the budget for this, consider just finding a few people in your network and asking them what they think about your findings. Many scholars will do this at national conferences or using social media. Engaging with your stakeholders will help you to find your blind spots – so consider diversifying the types of people you ask. Another hint would be to go back to your 99 use cases brainstorming activity to see if these resonate with your end users and stakeholders.

Step 4: *Find some role models*

Another method that you can use to inspire you to understand how others will engage with your work will be to find relevant role models or comparators and analyze how they accomplished the feat of convincing others to change their practice. This "competitive analysis" can be very useful as it will often highlight new ideas that you haven't thought of before. Sometimes the competitive analysis will be simply to ask around in your community of scholars for someone who has done a similar project and ask for advice.

Other times this may involve some level of literature review to determine how others have engaged in this before. There may also be avenues to explore Faculty Development offerings (see suggested resources below and in the references) to up your game with regards to scholarly dissemination, knowledge translation, and end-of-grant implementation strategies. To be honest, some scholars even ask openly on social media for advice on how to best engage in certain practices. The following resource provides some advice for those developing their academic brand:

A YouTube element has been excluded from this version of the text. You can view it online here: https://books.macpfd.ca/HPER-Primer/?p=75

Finally, getting involved in your institutional review board, ethics board, or grant review panels may give you great insights and help you to find examples of others who consistently identify, articulate, and then speak to the importance and potential impact of their work.

In summary, when explaining the potential impact of your work, you should consider the following:

- **Think about all your possible stakeholders –** Use elaborative techniques (such as mindmapping or brainstorming) to think about all the people that might be impacted by your work. Think both proximally (i.e. those who immediately would take your study findings and run with them) and distally (e.g. someone who might eventually be impacted by the work).
- **Know your audience(s) –** Knowing who would be a potential audience for the paper or grant will be key. If you are writing a grant, then this usually means you are writing to established reviewers and contributors to the field who know the landscape. If you are writing a paper, your editors, reviewers, and readers will ultimately want to know how your work is relevant to them. Make sure you build off of the work set forth by others, but also review the literature for controversies and dilemmas that you might want to highlight to show that you are well-versed on the field's conversations.
- **Consider consulting others to help you identify your blind spots –** Diversifying your grant or paper team can help you to identify your blind spots in how your work may impact the field (both positively and negatively). Building out a strong group of collaborators to engage in shared.

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UNIT 4:
THE LOGISTICS
OF YOUR PROJECT

Unit 4 is about becoming familiar with the "behind-the-scenes" work that is integral to every successful research project, including creating a research team, budgeting, timelines, and knowledge translation.

By delving into these essential aspects of research, Unit 4 constructs the groundwork for the successful operation of a research project.

4-1 Considerations for Research Ethics in HPE

TERESA CHAN

Overview

In this chapter you will explore research and scholarly ethics. While not all health professions education scholarship is research, it is important to understand the inherent challenges that are unique to the HPE scholarship scene.

> **Key Points of the Chapter**
>
> By the end of this chapter the learner should be able to:
>
> • Differentiate between research and program evaluation.
> • Articulate ethical concerns for health professions education that may not exist in other forms of medical, healthcare, or social science research.

Vignette

As the capstone project for her educator's certificate, Dr. Carmen Diego-Nunez had developed a curriculum weekend bootcamp on clinical skills in the virtual world. Now, after half a year of planning, her program had finally been approved to be delivered by the undergraduate curriculum committee and would be placed as an optional workshop in the curriculum in a few months' time.

"Congratulations on getting this program designed and started Carmen! This is going to be very exciting," stated her mentor Dr. Mary Park-Edwards. "But have you considered whether this study will require ethics approval? I think this could qualify as an exemption, but we still have to run it by our institutional review board..."

Carmen paused. She hadn't thought about that. Most of the courses and programs she attended in her schooling had a survey at the end of the program. Did they have to get ethics approval each time for each program evaluation survey? What about the patient experience surveys that she always had to translate and help her mom fill out? Did the ethics board govern all of those surveys too?

"I'm not sure," she replied. "Is there a place where I could learn more about this process?"

Mary replied: "Definitely. Let me find that link to the HPER chapter and send you that to read before our next meeting..."

A Deeper Dive into the Concept

Broadly speaking, all research should be done in an ethically sound manner. There are multiple precedents in the history of research that will be known to most researchers. The Tuskgeekee Syphilis experiments, World War II experiments on prisoners, research on nutrition in Canadian residential schools, these are well known to most scientists as the impetus for institutional review boards or research ethics boards (1,2).

The general premise of research ethics is to protect those who are subject to the research protocols, and to ensure that they do not experience undue hardship or complications. Research is meant to

ultimately serve society as a whole – and there are many groups involved in these processes ranging from granting agencies/funders to students or patients. At times there may be ties to industry and/or governmental policymakers too. However, regardless of the stakeholders, all research should be conducted ethically and soundly to ensure that the stakeholders do not negatively impact others (e.g. pharmaceutical company unduly influencing the results reported in a clinical trial). For more about general principles of Canadian research ethics check out this page from the Canadian Institutes of Health Research (1).

Ethical Considerations in Health Professions Education Research

While we are not usually conducting invasive experiments such as testing a new vaccine on our study participants, we must still bear in mind that there can be the potential for harm when conducting research in the health professions education domain. In Canada, our shameful history around nutritional research in residential school children (2) specifically drives home the importance of all researchers (especially those who are educators) to fulfil their moral and ethical obligations in safeguarding and protecting those who participate within our research.

For the purposes of our discussions, the Tri-Council Policy Statement 2 (2022) [Article 2.1] defines the following as research:
1. living human participants;
2. human biological materials, as well as human embryos, fetuses, fetal tissue, reproductive materials and stem cells. This applies to materials derived from living and deceased individuals.

There are also some forms of research that are deemed exempt from research ethics board (REB) review in Canada. The Tri-Council Policy Statement 2 (2022) [Article 2.2-2.4] (3) defines the following as research:
1. "Research does not require REB review when it relies exclusively on information that is a. publicly available through a mechanism set out by legislation or regulation and that is protected by law; or b. in the public domain and the individuals to whom the information refers have no reasonable expectation of privacy." (2, Article 2.2)
2. "REB review is not required for research involving the observation of people in public places where: a. it does not

involve any intervention staged by the researcher, or direct interaction with the individuals or groups; b. individuals or groups targeted for observation have no reasonable expectation of privacy; and c. any dissemination of research results does not allow identification of specific individuals." (2, Article 2.3)

3. "REB review is not required for research that relies exclusively on secondary use of anonymous information, or anonymous human biological materials, so long as the process of data linkage or recording or dissemination of results does not generate identifiable information." (2, Article 2.4)

The following are some considerations that can be important to consider when designing studies:

- **Power Dynamics** – Power dynamics (or the perception of these) can often be a source of this problem within certain populations. In clinical research or biochemical research, it is often clear that the participants in research often feel there is a power differential between them and the researcher (e.g. their treating physician or nurse who may be part of a clinical trial). Similarly in health professions education, researchers may have power over their potential participants. If a residency program director is seeking to study a group of potential student applicants to their specialty, one might imagine how there may be some ethical issues that might have to be navigated to minimize the impact of this power on the applicants? In response to issues around power within HPER, many institutions will have secondary review panels that include student stakeholders in reviewing potential research projects in tandem with the formal research ethics board. Within the McMaster University landscape, there is a specific secondary review panel that is run within the Michael G. DeGroote medical school that must sign off on all HPER that includes medical students.

- **Relationship to Clinical Environments** – While many HPER projects may not directly impact upon clinical care, if the work is done within a clinical learning environment, there may be indirect effects of introducing that research (or sometimes the researcher) to an environment. For instance, if an ethnographer wished to be embedded within a clinical team to observe how trainees interact with patients, this researcher may need to adhere to all the typical procedures and policies of any other healthcare provider (e.g. immunizations, workplace hazard training, patient confidentiality modules) to ensure that they do not breach protocols in place within the hospital.

- **Confidentiality** – In all research, confidentiality is very important for the conduct of any research – but in HPER, there can be multiple layers of confidentiality that may need to be considered. For instance, when studying excellence or shame within a nursing student population in a qualitative project, the students may be led via the interviews and disclose their own personal health information to contextualize their stories. Similarly, they may feel like the only way to explain how they felt was in the context of a specific patient encounter. In both cases, the participant may disclose identifiable attributes that could lead to a breach of confidentiality. As a HPE researcher, it is important to then be on the lookout for the way that your knowledge elicitation or data collection tools might influence your participants to tell their stories.

Exemptions to Research Ethics Board governance

In Canada, research ethics governance is determined by the TriCouncil Policy Statement (TCPS2), which is in its second iteration (3). There are some notable exemptions that impact health professions educators that are worth exploring in this section.

Before we do so, however, it is important for us to review the nature of education scholarship and note that not all studies that a health professions educator may conduct will be "research". In TCPS2, "'research" is defined as an undertaking intended to extend knowledge through a disciplined inquiry and/or systematic investigation (3). This means that the primary intent for embarking on a particular project will be to extend what we know about a specific area or domain. However, as defined previously in other parts of the HPER primer, education scholarship will include other forms of scholarship such as literature reviews/knowledge syntheses, needs assessments, program evaluation, narrative medicine, and knowledge translation.

As you may recall from earlier in this chapter Article 2 of TCPSC2 (2022) identifies several areas of research that are allowed that do not require ethics oversight (3). These are:
1. Public data (Article 2.2);
2. Data in the public domain with no reasonable expectation of privacy (Article 2.2);
3. Observation in Public Places (Article 2.3);

Secondary use of anonymous information or anonymous human biological materials (so long as the data linkage does not generate identifiable information) (Article 2.4).

Quality improvement

Specifically relevant to educators, Article 2.5 of TCPS2 (2022) highlights the following:

Quality assurance and quality improvement studies, program evaluation activities, and performance reviews, or testing within normal educational requirements when used exclusively for assessment, management or improvement purposes, do not constitute research for the purposes of this Policy, and do not fall within the scope of REB review.

Under Article 2.5, this means that program evaluation activities (such as surveys regarding courses or routine testing that exists for students in your classes) does not require an REB review. Certainly, this is an important clause for you to know as an educator, since it is important to know that checking to see if your specific program (or curriculum or product) is functioning well (either by surveys, focus groups, or interviews) is not considered "research". However, it is very important to ensure that such program evaluation activities stay within the bounds of evaluating a specific program and do not to stray into generalities and inferences about new insights gained.

Often this grey area is where HPE researchers can get into trouble. Researchers may wish to explore more deeply some ideas that come out of a specific program evaluation, but waltz into an problematic ethical zone if the project becomes more about the general pursuit of truth rather than a specific project. Broadly speaking, program evaluation activities should be used for the purposes of improving the project – it just might be that the story of your project will be useful to others seeking to embark on a similar project, and hence publishable as a work of quality improvement scholarship. In the clinical realm, there are whole journals that focus on quality improvement (e.g. BMJ Quality and Safety, Journal of Evaluation in Clinical Practice), and many of these projects may include some educational components or be focused entirely on the educational aspects of a given project. Similarly, many HPE journals have innovation reports (4) or other formats that allow educators to publish their educational improvement projects (e.g. needs

assessment for a new project, evaluation of an innovative curriculum/program).

The duality of some HPE researchers as being those in power over curricula can also create an ethically grey zone. For instance, if you were a program director and you chose to introduce a new curriculum purely for the purposes of finding out new things about a particular learner population (e.g. a one-off workshop on growth mindset with a pre/post survey including demographics and prior exposure to growth mindset), this could very well be seen as a research endeavour. However, if you were that same program director and determined that a workshop for new trainees on growth mindset would be beneficial, then the development, implementation and the evaluation of this new workshop would not be seen as research. If in doubt, it is always advisable to check with your local research ethics board. In Alberta, they have created an online tool [The ARECCI Tool] (5) that walks you through the thinking process for a given project. Locally, for instance at McMaster University, our REB prefers to review each project individually.

Creative Endeavours

Finally, for those engaged in narrative or creative endeavours, Article 2.6 of TCPS2 (2022) states:

> "*Creative practice activities, in and of themselves, do not require REB review. However, research that employs creative practice to obtain responses from participants that will be analyzed to answer a research question is subject to REB review.*"

This clause is important because some individuals may seek to engage in narrative medicine or arts-based techniques for teaching and learning. These materials may become a work of scholarship unto itself, e.g. an anthology of stories from medical students. However, as the statement above articulates, if you use arts-based or creative practice techniques to answer a research question, then the study would require REB review and approval. An example of this might be a healthcare improv session with physiotherapy students that is recorded, to be analyzed later for interactions between teachers and learners by a group of individuals interested in novel teaching techniques – such a project would require REB review and approval before proceeding. Another example would be a study where midwifery students are asked to draw rich pictures and

engage in graphical elaboration of their experiences with bullying in the workplace, with these pictures being analyzed later to answer questions that teachers might have about student experiences within the clinical learning environment.

Summary on Research Ethics

To summarize, the following table (4.1.1) shows some of the types of education scholarship that might qualify for exemptions, but if in doubt, your local research ethics board is the go-to place to review.

Table 4.1.1. Types of scholarship that may qualify for exemptions per the Tri-Council Policy Statement 2 in Canada.

Type of Scholarship	Details	Relevant section of TCPS2
Research	Research with Public data	Article 2.2
Research	Research with data in the public domain with no reasonable expectation of privacy	Article 2.2
Research	Research that includes observations in public places without interference by the researcher	Article 2.3
Research	Research that is resultant of the secondary use of anonymous information or anonymous human biological materials (so long as the data linkage does not generate identifiable information)	Article 2.4
Program Evaluation Scholarship	Program evaluation of existing educational programs (e.g. a course or an annual event) or routine testing of students/learners within their normal education parameters are not considered research. These works of scholarship will be very specific about the nature and outcomes of a particular mandate. Rarely, such projects will be novel enough for a broader reporting in the literature as a program evaluation project.	Article 2.5
Needs Assessment Scholarship	Quality improvement of existing programs/portfolios may include some assessment of local needs to improve local systems. Though these require some level of a scholarly process and these may resemble research methods (e.g. surveys, focus groups, interviews), the resultant reports and data will be very specific in their target needs for a specific program. Rarely, such projects will be novel enough for a more broad reporting in the literature as a quality improvement project.	Article 2.5
Creative Practice Activities	Creative practice activities that result in educational products (e.g. essays, graphic medicine, songs/music, short stories) do not require REB unto themselves. However, if researchers are using arts-based techniques as data collection methods (e.g. qualitative researcher engaging in rich pictures elicitation for data collection), then this would be considered research.	Article 2.6

Of note, the determination of what is and isn't research, however, is usually done at the level of a given institution. Although not governed directly by the TCPS2 documents, most journals will expect that you have confirmed with the research ethics board or your institutional review board that your project is deemed exempt per their perspective.

Authorship & Contributorship Ethics

Separate from research ethics but related still to HPER practices is the domain of authorship ethics. Although this is not within the boundaries of this HPER primer chapter, we would invite you to recall that there are some standards around authorship conduct that should be reviewed and respected by the members of your team. Please see the next HPER primer chapter ([Working Collaboratively: Building a Research Team](#)) to ensure that you have a good handle on this topic as well.

Key Takeaways

In summary, when considering ethics within health professions education research and scholarship, it is important for you to consider the following:

- Ethics within health professions education research must bear in mind power dynamics, confidentiality (both trainee/student and patient privacy), and the clinical impact.
- Not all education scholarship is "research" and do not always require REB approval, but determinations of REB oversight and governance are usually set forth by local review boards. If in doubt, check with them about any and all questions.

Vignette Conclusion

After a discussion with Dr. Park-Edwards, Carmen embarks on a deep dive into program evaluation techniques and literature – emerging

with a plan for a very robust program evaluation that specifically seeks to answer questions about her particular curricular innovation.

After developing the program evaluation protocol documents (including a survey tool and a follow-up stakeholder interview guide), Mary helps Carmen to submit the documents for a formal exemption review from their local Research Ethics Board chairperson. After some correspondence and a short phone conversation, the REB chairperson agrees that this falls well within the auspices of a robust and scholarly approach to a curricular program evaluation and writes Carmen a formal exemption letter that she can keep on file.

5 years later...
After several iterations of her curriculum have passed, Carmen is now a junior faculty member still running this program. Over the course of the past 5 years, Carmen has overseen the expansion and growth of this novel curriculum, and her Department Chair highlights to her that she has seen nothing like this at other institutions. She encourages her to consider writing an article that describes the program.

Taking her exemption letter back to the REB (since the REB Chairship has changed), confirms that they still consider her program evaluations to be exempt per the most recent version of the Tri-Council Policy Statement. Carmen sifts through her program evaluation surveys and old curricular improvement reports to assemble the story of her workshop. She is amused by her early interviews with participants, noting that many of them are senior residents at this juncture. She assembles an article featuring some of the evaluation data for an article at a top journal within the health professions education field. She invites Mary to participate as a coauthors in this article, even though she has now moved to a different centre to become Vice Dean of Education. Mary politely declines as she is quite busy, but graciously thanks Carmen for including her as a collaborator on the project and is happy to be listed in the acknowledgements.

On the day that Carmen uploads the article for submission, she smiles and wistfully remembers those early conversations she had with her former mentor. She is especially thankful for all the guidance that she received from Mary back in the day since one of the first things that the journal asks for is a letter attesting to the exemption for this project.

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Additional Resources

If you are interested in finding out more about Program Evaluation, you can check out this podcast MacPFD Spark Podcast episode with Dr. Michelle Howard, Associate Professor, Department of Family Medicine, McMaster University:

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4-2 Working Collaboratively: Building a Research Team

YUSUF YILMAZ AND SANDRA MONTEIRO

Overview

Collaboration is critical to conducting good research and designing good education or innovations. In any discipline, it is a rare situation where an individual has all the knowledge, skills and perspectives required to identify a good idea and develop it to completion and dissemination (1,2). An individual cannot manage all tasks in an efficient or short amount of time.

Critically, health professions education is a rich, multidisciplinary environment that requires collaboration across diverse professions, epistemologies, and identities. A scientist may not be able to appreciate the nuances of clinical practice if they do not collaborate to understand the key issues. A clinician educator may not have the capacity to translate all aspects of education science without the support of a researcher. Simply put, we all have gaps in our ability to understand the unique education challenges that we are interested in exploring and can rely on various kinds of experts to supplement our knowledge.

This form of collaboration can create a richer, more complete understanding, but can also be more efficient as experts are much faster than novices at handling tasks within their scope.

By the end of this chapter the learner should be able to:
1. Describe the importance of teamwork for research
2. Identify the priorities when setting up a new research team
3. Recognize the challenges for collaboration with novel research teams or team members

Vignette

Samir decided to talk to his supervisor about the challenge he perceived regarding getting such a diverse team to successfully coordinate their schedules and write together. She suggested that he apply his expert organizational skills to create the writing plan, but then involve the others on the team to complete some of the tasks. She also suggested that he take advantage of available online applications, like Google Docs and Microsoft Teams to create shared space for idea generation, without the need for synchronous meetings.

Deeper Dive into this Concept

Organization and clarity are key to the collaborative writing process. Whether you are writing collaboratively to produce an academic manuscript, or to design new learning objectives and activities for a new curriculum, there are some key principles that can help keep you on track.

First, it helps to identify a leader – not everyone can steer a ship all at the same time – so pick a captain who will be responsible for keeping everyone on task. It is also the leader's responsibility to make sure there is a shared model of the goal, that everyone on the

team understands how they can contribute to the goal and that everyone agrees on the key timeline and checkpoints. Although it can be a challenge managing multiple busy schedules, attempt to start with one synchronous group meeting to create a shared model of the goal. Online applications like Doodle (3) polls or When2meet (4) can be useful in achieving this goal. Also consider holding the meeting online in Zoom (5) or Microsoft Teams (6) as this will allow you to easily record the meeting discussion, which can be transcribed for future review by the group or individuals who could not attend.

Second, be clear on roles and authorship. Review the ICMJE authorship criteria so everyone understands the standards for authorship (7). For academic manuscripts, it is conventional to list all contributors' names in the order of their level of contribution. The key author positions that are often important for those who write in academic medicine are: first author (the team leader), second (the second-in-command), and senior (the supervisor and/or mentor of the first author and/or the person responsible for a broader program of research). It helps to be clear on these positions at the start of a project, although circumstances may require flexibility over time. The first author is most likely to create the first draft or outline. Ideally, the first author is also the team leader, however this may not be the case for every team. Sometimes, the person elected to manage timelines and expectations is someone in the middle or the senior author.

Third, explain the writing process to everyone on the team and assign roles accordingly. It may seem like common sense, but all writing starts with the first and worst draft. The team members take turns editing it to a better version. Ideally, one person is responsible for the final edit in a consistent voice and style. Moreover, supplementary roles that may be required are a content expert – perhaps someone leading the field who can offer consultation. This person may already be on the team, or can be invited at a later stage of writing to consult. Because this consultant would not meet authorship criteria (see ICMJE criteria), they can be mentioned in the acknowledgments.

Fourth, collaborative writing can be highly efficient with the support of various online applications. A common application is Google Docs (8) which allows multiple team members to log in simultaneously, or

asynchronously, to edit a single document. It is worth your time to learn how to track edits using the version history and make suggestions (i.e., tracking changes style of annotated suggestions). Google Docs also allow using third party citation managers. Zotero is one free and open source tool that fully integrates with Google Docs and provides citation management in a document (9). The table (4.2.1) below, taken from Yilmaz et al. identifies several online resources that can be used in an asynchronous fashion to facilitate collaborative writing, without having to schedule group meetings to write together (10).

Table 4.2.1. Collaborative tools to enhance your learning (10)

Function	Tools	Applications for your Collaborative Writing	Best Practices
Whiteboard for brainstorming	Google Jamboard Google Docs Google Slides Mural Miro Zoom's "Whiteboard" feature	Use the sticky note technique to share and to organize thoughts. Sticky notes can facilitate organizing themes and components to discuss with team members. "Brain dumping" on each sticky note allows free flow of thoughts; the team can subsequently eliminate those they decide to exclude.	Convert sticky notes to an outline to build a manuscript's story. Each sticky note should contain a single idea to allow for easy organization. Colour coding sticky notes can facilitate organization. For instance, green can signify positive, yellow can signify neutral and red can signify contradictory ideas and opinions. Alternatively, colour codes can correspond to different authors, representing assignments or ideas. Create grids or columns to organize sticky notes.
File sharing & organization	Google Drive Dropbox OneDrive MS Teams	A project may have multiple files. Storing documents and versions on the cloud allows team members to access them ubiquitously and instantly without sending through email or any other way. This prevents losing files from emails or a computer's local drive. The cloud providers have extensions to synchronize the files with the computer's local drive which allows local work and synchronizes the files cloud automatically. Creating and hosting figures and tables in separate	Maintain appropriate privacy and security settings for datasets and sensitive non-anonymized content through password-protection where applicable and use of the appropriate platform. Ensure IRB approval for storage practices. In some instances, the use of your institution's designated cloud storage platform may be required to meet data security and privacy standards. (e.g., macdrive.mcmaster.ca). Utilize version history for retrieval of deleted content. Although Google docs allow for simultaneous editing of the same file version by multiple collaborators, other cloud storage platforms that

			documents when they cannot be integrated with a writing canvas. Additionally, dataset, analysis results and other project-related documents can be synchronized throughout the team members	save files as MS Word documents can generate multiple copies when collaborators edit them simultaneously. Multiple exports may disrupt version control and require authors to manually merge different versions. Let your collaborators know when you actively work on the file. Some platforms allow authors to "lock" a file when actively editing it. Save files with version suffix (e.g., "name of the file _ V2.docx") and append your initials to the file name that you let others that you reviewed and/or edited the file (e.g., "name of the file _ V2_YY_TC.docx").
The writing canvas	Google Docs, Dropbox Paper, Microsoft Word Office 365		Online documents that support synchronous writing on the same document with team members. Perform simultaneous edits and writing. When utilizing a mode that tracks changes, perform regular 'change acceptances' to make the document easier to follow. First or last author may lead on integrating changes and suggestions with the document. Version history and version naming provides quick access to the snapshots of the document's status at a given moment. This also provides a record of changes made by specific team members.	Enable document change notifications. This will motivate and inform other team members that a team member is working on the document. This feature will "nudge" other team members to write. Commenting on the document by highlighting specific text enables further discussion. Team leaders or specific authors mentioned in the comment can "resolve" comments once they address them. Create a general template with specific article headlines and use when starting a new project (e.g. https://docs.google.com/document/d/1AAaViuLF-hY1E3_aAoyBISghHCL6nLG336g_0pQO28k) Use headline styling to create a table of contents; this allows for efficient navigation to specific sections of a manuscript using the navigation pane.
Asynchronous Communication	Slack MS Teams WhatsApp Email Text Message		Asynchronous communications facilitate project completion, particularly for individuals operating in different time zones and on different schedules. Although most asynchronous communication has traditionally occurred via email, chat-based platforms allow for more natural	Ask, share and help the progress via asynchronous communication Tag specific co-authors for whom you have specific questions in order to generate an alert/notification to them. Continued engagement and idea creation foster virtual communities of practice.

		"conversation" and enhanced organization and storage of project files and discussion in a central location.	
Reference management	Zotero Paperpile Mendeley Cite Endnote	A few citation managers work with an online writing canvas for easy citation on online documents. While there are common formats for citation styles (e.g., AMA, APA, Vancouver), some journals require specific formats which one cannot incorporate into the citation managers easily. In this case, finding the right style using Citation Style Language (CSL: https://csl.mendeley.com/about/) makes the citation experience seamlessly easy. Using the visual designer, you can find the most similar format to your needs and even you can further add custom edits.	Use group features of citation managers to edit bibliographic information of publications. If your team is less tech-savvy, assign a citation management role to one team member. This way will not need group features for citation. Zotero allows from Google Docs to Microsoft Word conversion without losing the citations already cited within the manuscript. Use comment bubbles for citation information and put DOI, bibliographic information or the URL of the article to make it easier to cite later when you cannot work with the citation manager at that time which also makes writing quicker.
Meeting scheduling software	Doodle When2meet	Coordinate times for synchronous meetings among groups of authors with varying schedules	Specify the time zone of the meeting times when working with others in varying geographic locations. Be mindful of work-life balance; recognize team members may wish to avoid early morning, evening or weekend meeting times unless absolutely necessary. Provide several options and allow participants adequate lead time before the first meeting option to enter their availability. Provide a deadline for poll completion and send reminders to complete the poll as necessary. For smaller groups, deciding the next meeting time in real-time at the end of a synchronous meeting may represent a more efficient approach than utilizing meeting software.
Calendar management software	Gmail Outlook	Schedule synchronous meetings. Add deadline reminders to the team members by	Send calendar invitations with embedded links to video-conferencing software and relevant cloud-based documents to officially

| inviting multiple calendar invitations. | reserve them on team members' calendars. |

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Key Takeaways

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In summary, when approaching a collaborative activity, whether research design, curriculum design or innovation, always be clear about individual and group expectations.

1. **Sharing -** Create shared accessible material that helps everyone track progress and understand their role.
2. **Be Explicit -** Identify key tasks and connect them explicitly with individuals and deadlines.
3. **Structure** – Ensure that there is a transparent structure to your project. Whether you are building a research team or writing a paper, it is vital to spend time and effort making sure everyone on the team understands the goals, deadlines and their role within the team.
4. **Support** – Encourage psychological safety within your team so that when team members encounter barriers or challenges they can ask for help. Establish checkpoints to make sure everyone can celebrate their progress or can ask for help with their tasks
5. **Flexibility** – Be prepared to change the plan when necessary. As clear as the plan is at the beginning, there is always a chance that new data will lead you to reconsider your original goals or research questions.

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Other suggested resources

1. [MacPFD Google Docs Template for Academic Writing](#)
   The above hyperlink leads you to a template that you can use to kickstart your team's writing. It has the ICMJE criteria listed as well as a grid for scaffolding your initial co-authorship discussions as well.

2. **MacPFD Scholarly Secrets – Collaborative Writing – Part 1: Overview of Google docs & Zotero (38 mins)**
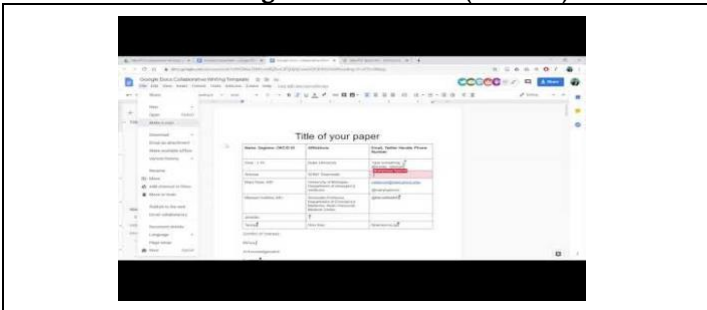
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3. MacPFD Scholarly Secrets – Collaborative Writing – Part 2: The Benefits of Collaborative Writing & Tips (35 mins)

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4. MacPFD Scholarly Secrets – Collaborative Writing – Part 3: Timelines, Coordination & Outlines (15 mins)

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4-3 Road to Publication

SIRAJ MITHOOWANI AND TERESA CHAN

Overview

Have you ever dreamed of having a paper published with your name on it? The journey to get there can be more challenging than it seems. Getting started in academic scholarship can be challenging. Walking from idea conception through to publication and dissemination can seem like a very long road. In this chapter you will explore the overall journey that scholars and scientists take to get their work published.

Key Points of the Chapter

By the end of this chapter, readers will be able to:

- Describe the steps to take a paper from idea to publication.
- Articulate the general steps in a health professions education journal editorial process.
- Create a list of resources that may be useful to help aid their development as writers.

Vignette

Dr. Shashi Benson was so proud of her postdoctoral fellow, Nico. Nico had just presented his education scholarship abstract at an international conference and received rave reviews. The abstract was selected as the top trainee abstract at the conference and was getting a lot of attention on the conference hashtag. Nico also reported that several individuals had approached him and stated that they were interested in reading his manuscript.

"You need to take a few moments to revel in your success," stated Dr. Benson proudly, "But your fans are right... We should try to write this up."

Nico nodded with trepidation. He'd written a few papers up before, but other than his dissertation papers, he'd never been at the helm of a project team. "I agree — I think riding this momentum would be fantastic! I jotted down some notes immediately after my presentation based on the comments and questions I received after my abstract session... so I'm hoping to turn that into the limitations and discussion parts of my paper."

Dr. Benson smiled. Nico was really starting to think like a scientist. "Good! That means you were on the ball with things! You're definitely owning the 'first author' chops on this go around! What else do you need help with? How can I help Nico?"

Nico scratched his head. He'd found this really amazing guide at the McMaster Program for Faculty Development — the Health Profession Education Research manual... He thought back to the section on the "road to publication" and pondered what he could get Dr. Benson to help with?

Deeper Dive into this Concept

First off, if you're reading this section, you're likely thinking about publication of your scholarly work. Congratulations on taking the first step down the road to publication! Many projects in health professions education don't make it past the abstract stage, so that you're thinking about taking a step down this road should be recognized.

The Challenge

Let's be honest – presenting at conferences is exciting. Often, scientists or trainees are incentivized to get on the road to present their work at a national or international conference. However, taking that conference abstract and turning it into a full paper – that is a different story.

In one study, it was found that only 35% of medical education submissions out of two conferences (Research in Medical Education at the American Association of Medical Colleges; Canadian Conference on Medical Education [CCME]) were eventually published (1). Another more recent study found that only 31% of papers at CCME were eventually published (2).The road to publication can be a difficult one, mired by fragmentation of time, lack of "protected time" (i.e. funded time to engage in education scholarship), prioritization of other work (Clinical! Trainee support! Administrative! Leadership!), and a general sense of ill-reward for the extra effort (3). Unfortunately, our HPER chapter cannot help you with these. One big barrier, however, is the lack of expertise and access to mentors to help with this work.

An Approach

To start us off, the following is a short video that features Drs. Teresa Chan and Sandra Monteiro discussing 10 steps that are involved in getting your project from idea to publication.

Below the video link, we have detailed these same 10 steps…. and added some additional literature and insights to assist you in your journey.

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Step 1: Figure out your idea

When beginning your scholarly journey, it may be helpful to think broadly about the educational problem that inspires you, then gradually narrow your scope into a single research question. Scan the literature on the topic or discuss your idea informally with colleagues. Also consider your goals and the end product of your scholarship. Are you looking to produce a curricular innovation, program evaluation, or review paper? Are you looking to build upon or challenge an established practice or educational theory?

Step 2: Read broadly. Understand the conversations that are out there.

Think about journals as conversations between scholars – by scanning the literature, you can 'eavesdrop' on these conversations to get a sense of what's already known, identify controversies or unanswered questions, and identify influential thinkers in the field (4).

Don't be afraid to step outside your comfort zone and read outside your specific discipline or epistemology. Medical education scholarship often bridges and intersects research in cognitive psychology, behavioural economics and other social sciences. Read the literature with a view toward crafting your own research question (5). Don't be afraid to move back to Step 1 and refine your idea after situating it within the broader scholarly discourse.

Most importantly, stay organized! Maintain a list of the most relevant papers you find, take detailed notes, and reflect on how concepts in the literature are connected to one another. Strategies to search the literature efficiently are covered in Chapter 2-1.

Step 3: Build your team

At this point, you will either be a member of a team that is already working together or building your own team from scratch. Consider who you would like to include and how they would fit into your project. You might want to invite team members that specialize at finding articles (research librarian), writing, study design (methodologist), data analysis (statistician), or who have specific insight into your educational context or problem (frontline educators or learners). At this stage, it is critical to explicitly discuss authorship so as to avoid awkward misunderstandings and hurt feelings at the end of your project. Collaborating effectively with a research team is covered in more detail in Chapter 4-2.

Step 4: Develop and write your study protocol

A study protocol acts as a roadmap or playbook for your research team. It outlines background information that you identified from your literature review, specifies your hypotheses, aims and research question, and lays out your methods in detail. It also serves two other concrete purposes – a research protocol is often required to gain research ethics approval (or exemption) from your institution and it can also be adapted to apply for research grants.

Step 5: Data collection

Data collection should only proceed after appropriate institutional ethics review or exemption (refer to Chapter 4-1 for more detail). Consider pilot testing your data collection instruments with your study team or a small group of participants before rolling them out for broader use. For example, pilot testing an online questionnaire

might identify technical glitches or issues with an individual item's clarity or relevance to the research question ([6](#)). Consider technological aids that can help with data collection, such as [Google Forms](#) or [Microsoft Forms](#) (for questionnaires) or [Covidence](#) (for systematic reviews of the literature).

Step 6: Data analysis

As a junior researcher, it is helpful to have a data analysis expert on your research team. Most data analysts prefer to be involved early in the research project. If they are involved early, they can help align your research question to your data analysis plan and write the Data Analysis portion of the research protocol. If you're a graduate student, involving your supervisor at this stage can also be helpful. Consider familiarizing yourself with data analysis software that is relevant to your project and seek out [expert consultation when needed](#).

Step 7: Writing with your team

First, take stock of your findings and reflect on whether they support or refute your original hypothesis and how they might be situated within the broader literature. Putting your research on paper can be a daunting task (even for experienced scholars!) To make things more manageable, set a schedule and put the 'project manager' in charge. Employ the diverse strengths and knowledge of your research team to write collaboratively. It may be helpful to delegate writing specific sections of the paper to different members of the research team depending on their knowledge and experience. Tools like [Google Docs](#) or [Zotero](#) (a free reference manager that can be used with Google Docs) can help your team work collaboratively in real-time. More information on writing collaboratively can be found in [Chapter 4-2](#).

Step 8: Putting together your first draft

Write with a view toward persuading your audience that your work is important, timely and relevant to them.

Consider framing the introduction of your paper using the [problem/gap/hook heuristic](#) to draw readers into your work and to situate your research into the broader scholarly conversation (4). Specify your methods section in enough detail that a reader could

theoretically replicate your work. In the Discussion, interpret your findings and connect them to the literature you identified in Step 2.

Getting your paper published needs persistence and resilience! Pick your target journal along with a few other journals that will be your backups in case your paper isn't accepted to your top choice. When choosing a journal, consider your target audience and whether the journal is open access and/or has any Article Processing Charges. Make sure your research team is familiar with the International Committee of Medical Journal Editors (ICJME) criteria on authorship (7).

Step 9: *Submit to your target journal*

Congratulations on making it this far! At this point, you have written your paper and painstakingly formatted it based on your target journal's specifications.

At this point, it's important to recognize that only 10-20% of papers are ultimately accepted for publication. Even when a paper is ultimately accepted, authors are usually asked to 'revise & resubmit' their manuscript which can sometimes mean extensive revisions based on feedback from reviewers and editors. Even if your manuscript is rejected after peer review, use reviewer comments to reframe and improve your paper before submitting it onward to the next journal. Make sure that you only submit your article to *one publication at a time.* Unless you are publishing a preprint (8), most journals will require you to guarantee that you have your work under consideration at their journal exclusively. This means that you must either wait for a journal to reject your article or withdraw an article before submitting it elsewhere. Preprints, which have been popularized during the COVID-19 pandemic) are used by scientists to share their findings in a pre-peer review format in a manner that allows them to gather feedback from the broader scientific community (9). Popular preprint archives are usually associated with scholarly populations, although there are general preprint servers as well:

- General Preprint Servers – Authorea, OSF Preprints, PeerJ
- Social Sciences: Social Science Research Network (SSRN), SocArXiv
- Health professions include: medRxiv, bioRxiv

For some insights on the journal editor's point of view, listen to this MacPFD Spark podcast which features Dr. Teresa Chan interviewing Dr. Laura Roberts & Mary Beth DeVilbiss from the leading journal Academic Medicine.

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Step 10: Share your success!

Phew! You successfully published your paper. Congratulations!! Now take a deep breath and consider how you will let others know about your findings and ultimately translate your research into action. Think about implementing your findings locally, presenting your work at local, national or international conferences, and amplifying your key messages through social media, blog posts or podcasts. Consider using a knowledge translation framework, like

the Knowledge-to-Action cycle (10), to implement your research findings systematically and deliberately. Refer to [Chapter 4-5](#) for more information on knowledge translation and dissemination activities.

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Key Takeaways

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Taking a research project from conception to publication is a long journey but it can be made easier and more efficient if you take the following steps:

- **Be deliberate** – Think about the educational problem that inspires your work, your target audience and the end-product of your scholarship. Consider making an outline of your research protocol (or manuscript) at an early stage and filling it in as you move through Steps 1-10 in this chapter.
- **Research is a team sport –** Choose collaborators that can keep you on task and who can follow through from conception of the research question all the way to publication. Consider whether your project might benefit by including specialists at writing, project management, data analysis, knowledge translation, site and logistics management etc..
- **Know your audience –** Submit your research to a journal that is read by your target audience and situate your findings within the broader scholarly conversation. Disseminate your research by presenting your work at conferences and amplifying key messages through social media, blog posts and podcasts.

Vignette Conclusion

"You know what, Dr. Benson? I've actually been writing as I go for this paper, so my rough draft of the abstract, introduction, and methods are largely done. Do you mind if I send you the link to the paper and you can review it with an editor's eye?" Nico asked.

"Yes that makes sense – but please, I've told you too many times, please call me Shashi," Benson replied. She was very proud that her apprentice was becoming so masterful at this whole process. "But before I review, do you have a sense of your target journal so I can read with that group in mind?"

"Yeah, so in the HPER manual they suggest that we plan three to five journals deep, in case we don't get an immediate acceptance. LOL!" Nico chuckled. He knew how hard this whole game was, but he thought it was good advice to have a back up plan... or four.

"In discussions with the team so far, I think we were thinking of hitting up: Journal of Continuing Education in the Health Professions, Perspectives on Medical Education, and then maybe Canadian Medical Education Journal? I think these are all really great journals so I would be really happy if we publish in any of them."

"Great choices Nico," Shashi stated. "I'll take a look then at the journal's 'About' page and figure out what their editorial stance is all about and review a few papers from your first choice journal that are from the same article type so that I get a feel for things..."

"Oh, I'll add a few of my favourite articles from that journal to the email I'll send you. Not a problem!" Shashi exclaimed as she beamed with pride. Nico was really coming into his identity as a health professions education scholar

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4-4 Research Project Logistics: Project Management and Study Schedules

MARK LEE

Overview

We've all been there at some point in a project where we wish we had planned better how we were going to approach this project, and been more proactive at the start. Whether it was in high school – remember those "dreaded" high school projects – or even now as mid-career scientists managing a research project that has just completely unraveled or stalled. It had nothing to do with the quality of the idea, nor necessarily the volume of work and multitude of components that needed to be managed. Rather, it was the way you and/or your team approached the process, by choice or by happenstance.

As someone who has had these experiences, I'm reminded how important – yet rarely – we talk about the process. How did we get here? How come this worked well? How come this didn't work for our team? We often undermine the skill required to navigate and manage the logistics of a project. Yet, no matter how great an idea, things can easily go awry if we don't dedicate time to discuss the progress – the "HOW" that gets us from start to finish. The hope of this chapter is to provide some tips and tricks for anyone who is a part of a research team on how to approach the process of research project management.

By the end of this chapter, the learner should be able to:
- Discuss the various considerations when navigating a research project.
- Apply different strategies and tools when managing research projects.

Vignette

A rare lull on a rainy autumn Friday afternoon. It's been a week of back-to-back meeting days for Dr. Rayleen Yang, and as she looked at her calendar and their seemingly never ending to-do list, a wave of angst overwhelms their mind.

"Deep breath, Ray, deep breath", she reminded herself.

It had been almost five years since Dr. Yang had first started as an assistant professor position with the Rehabilitation Sciences program as an education scientist. The first few years felt relatively smooth sailing, she had been mostly publishing some previous work and starting a handful of new studies. However, between current project delays, new collaborations on papers, and then successful grants that required getting started, she was starting to wonder how she would ever manage to juggle so many projects!

Looking out the window, Rayleen was reminded of words she had heard often during grad school: "Trust the process." As much as she trusted she could get everything done, she was starting to wonder if there's a better way of approaching projects to optimize efficiency – a question she'd never really had to stop to ask themselves.

Deeper Dive into this Concept

Organization skill seems to be one of those generic aptitudes frequently thrown out in interviews and performance reviews, often talked about in this binary of "you have it" or "you don't have it". While some individuals may be 'naturally' organizationally-minded, I never found these distinctions helpful as it misses the point that organization is something that we all can actively work on and that has some context specificity to it (i.e. some strategies will work in some situations and not others).

Functionally, the goal of discussing research project management is not to see organization as some general skill, but rather helping people explore and build strategies and tools to stay organized. It's easy to say "stay organized" – but what does that actually mean in the context of research project management? What are some particularities of research in the health professions education (HPE) world? We provide some thoughts on this matter that complement the existing resources in this chapter. Throughout, we've highlighted some questions to ask you and your team, key insights, and additional considerations that weren't particularly discussed in the other chapters.
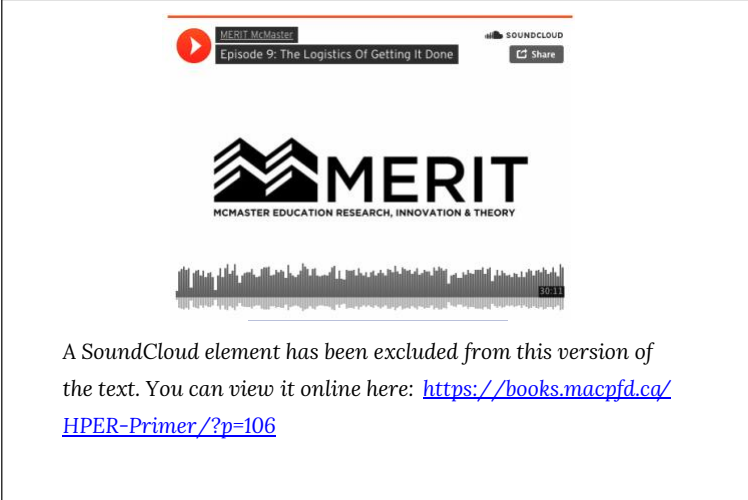
Understanding the project

Scope, Outcomes, and Deadlines

Before you talk about managing a project, you really need to understand the scope and scale of your project. On the next page you will see links to two podcast episodes. In episode 9 and 10 of the HPER podcasts Drs. Teresa Chan, Larkin Lamarche and Mark Lee speak to great lengths on this topic; some key questions to ask yourself include:
- What are your project objectives? What do these objectives look like in terms of deliverables?
- Does this project have multiple partners, sites and/or phases? Check out the paper by Schiller et al. (3) on multi-institutional project management.
- How will the methodology impact the task list needed to be completed before or during the study?
- Taking the typical progress of a research study, is there anything that will be similar and/or different for the context of this particular project?
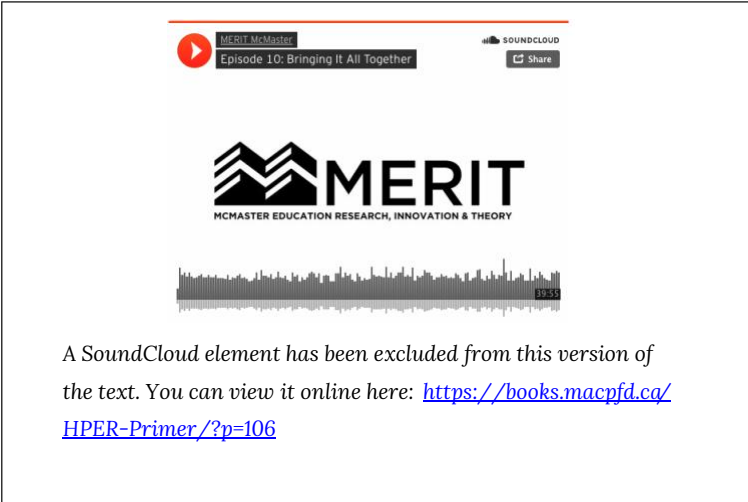
Take a listen to these podcasts as they speak to project management.

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At the onset, it's valuable to lay these components out explicitly, as your outcomes and deadlines will be impacted by your answers to these questions. With project objectives, being able to outline the deliverables can help you get a sense of your task list. These deliverables can look like the final report, published paper, but also deliverables within the steps of a research study (e.g. cleaned datasets, de-identified transcripts). This will not only help you

accurately establish a realistic timeline, but also avoid forgetting steps down the road.

Assess if the scope is feasible given the parameters of the project (e.g. timeline, resources). If not, take a moment now to figure out what additional support you might need.

Understanding your Institution

Academia is not without its volume of organizational bodies that tend to be involved throughout the research process. This could include: research ethics boards (REBs), financial approvals for grants, and department/program-level approvals. In HPE, we often will also require approvals from the chair of the student programs, from which our participant pool is sampled.

The hope is that you're able to send the same documents (e.g. protocols, instruments) to all organizations for review. That being said, keep in mind that different organizational bodies may require specific framing based upon their interests. For example, student programs may be more interested in understanding how your research will pull on the resources of the program and take students away from their studies. How might you frame your project so the program fully understands what you're asking from student participants?

Consider building rapport with individuals in these organizational bodies. It often is helpful to have a go-to person in each organizational body for nuanced and/or urgent matters.

In the context of HPE research, a valuable consideration when applying for ethics is whether your project falls under quality improvement and/or program evaluation. Some institutions will have a separate approval process for these projects; some even have separate approval for education research projects regardless of intent. These processes will often be shorter and quicker than going through a full ethics review, which may be a consideration based on the scope and deadlines of the project. That being said, there may be implications with publication as some journals require studies to have gone through a full ethics review. Read the fine print before proceeding through this route. See Chapter 4-1 for a more in-depth review of this topic.

Timeline, Roles and Expectations

Remember when you explicitly laid out all the components of the project: objectives, deadlines and outcomes? The next step is to pull up that list and see if it requires further elaboration. Take a look at your tangibles and see if there are any tasks that require breaking down further. How granular you go will really depend on your experiences with this process (the newer, the more granular). The importance of this step is that it recognizes that if this is your first time completing a task (e.g. ethics), it may require unpacking all its subcomponents.

Don't re-invent the wheel

Have templates for similar processes (e.g. ethics, grants, institutional forms). Something might take half the amount of time simply by having existing templates to work from. This idea was previously been mentioned in Chapter 3-1.

With all your components, you can now start building a timeline. Usually there is a "end-date/time" to projects (e.g., when you need to submit a final report to a granting agency).

If not, it's still probably helpful to have some project end date (e.g. when do we want to have a finalized paper to submit). Working backward from that end date, you can start to approximate when the various pieces of the project need to be completed. Gantt charts (5) can be a great resource to visualize your tasks relative to the timeline.

> **Exercise:** *Some Questions to Consider about your Timeline*
>
> - How long will data analysis take? Will this process occur iteratively and require analysis during data collection? Based on the volume of data, how long might it take to clean the data so that it can be analyzed?
> - Are there timelines for review processes by organizational bodies (e.g. ethics, departmental approvals)? Do these organizational bodies meet regularly? If so, when do you need to have documents submitted to them for review?
> - How long will it take to write? If you're writing in teams, how much time will you allocate for internal review?

Always allocate buffer time for any review processes, even signature requests – this step can take longer than you anticipate.

If you are working with a team – in HPE research, this is probably a given – check to see that everyone is on-board with the timeline. As Dr. Lamarche and Chan mention in episode 10, if a step is new to you, it might also be helpful to reach out to individuals outside your team for advice. This may be another researcher who has completed a study like yours in the past, or even a research support staff who has deep insights on completing specific processes. They may have valuable insights to share to make the process go smoother. Consider consulting Chapter 4-2 which covers the topic of collaborative writing in more depth.

Roles and Expectations

When working in teams, it is imperative that you discuss roles and expectations as a group, especially early on in the project. The phenomenon of diffusion of responsibility is a real concern in groups, and when everyone is busy and balancing many other projects, it's easy to assume another team member will pick up the slack. It's important to explicitly talk about roles and expectations now rather than later, when things may have fallen through the cracks. For research projects that you're hoping to publish, consider who will be part of the authorship team and what contributions they will need to make in order to meet ICMJE authorship criteria (6). Having this conversation at the start will help mitigate any awkward conversations later on when stakes might be higher.

> **Exercise**: *Some Questions to Consider about your Team*
>
> - Will specific individuals lead different parts of the project? How might this impact the authorship list?
> - Given the strengths and availability of the team members, how might we optimally lean on each team member to complete this project?
> - Do we need extra hands? Is there value to hiring research staff (e.g. research assistant, research coordinator) to support this project? What skills might you be looking for these additional individuals?

- If it's a very collaborative team, how do you ensure pieces don't get missed? *Additional Consideration: If you are leading a team for the first time, Gorsky et al. (2016) has a list of project leadership principles that might be valuable to review.*

Project execution & monitoring

With tasks outlined, roles delegated, and expectations discussed, it's time to start the project itself. But wait – how will you keep track of all these moving parts and keep each other in the loop? As listed in the research project management infographic, there are three things worth establishing:

- **Shared work space and communication platform:**
  - Where will you keep all your files? Consider the value of folders to keep documents organized and make it easier to retrieve documents.
  - On what platform will you stay in communication with your team? Emails might be great for providing updates, while communication platforms like Slack, Microsoft Teams, might better suit back-and-forth conversations. Google Docs messages may also link your team in a shared writing canvas that allows for communication via margin comments as well.
- **Meeting minutes:**
  - We often underestimate how valuable it is to have a record of decisions and notes to refer back to. How many times have you had to revisit the same conversation because your team has forgotten what you had decided in the last meeting? Or, a team member had some great insight for the discussion section of a paper during data collection, but no one remembers it now?
  - Additional Consideration: Consider taking notes every meeting, whether throughout a meeting or at the end by summarizing the main takeaways and next steps at the end of each meeting. Could you assign someone to do this (e.g. research staff, students, junior team members)?
- **Project management tool:**
  - With more nuanced projects, it might be worth exploring a project management tool to keep track of to-do lists and assigned tasks. While keeping a running document might be the simplest form, these project management tools not only allow for cross-compatibility with other apps (e.g. Goole Documents), but can also do automatic notifications and reminders. There are many free options nowadays, so don't be afraid to try something new!

Again, all of these points and a very useful summary of collaborative tools are more fully discussed in the HPER Chapter 4-2 (Working Collaboratively).

Monitor Progress

With the project underway, it's always valuable to routinely review the progress, especially if you're the lead or organizer. This is your moment to take a step back and look at the project as a whole. Are tasks moving along? Are the established deadlines still realistic? Any new objectives or ones that require modification? If you're navigating multiple projects concurrently, it might be valuable to create a tracking sheet so you can look at your projects all together (see the Research Project Management infographic for a link to an example Excel sheet). Proactively set up team meetings. Even if there are no imminent deadlines, I have found it helpful to set up regular meetings for projects, or to set up the next meeting at the end of a meeting. How often has this happened where you want to meet to discuss a semi-urgent matter but because most people's schedules are booked to the max, you're looking at dates in a month's time?

Conclusion

It is important to build a tool belt of strategies that you can pull from when you need to in the context of learning. Project management is no different. The tool belt analogy acknowledges that sometimes you will be able to use tools you already have. However, sometimes you'll need to go out to find new tools to add to your belt. Trust yourself and the tools you've gathered so far... but don't be afraid to try something new and re-evaluate when necessary. Remember, it's all about the process!

Key Takeaways

Remember the ABCDE's of Research Project Management:

- **Act proactively** – Taking the time at the beginning of projects to check-in and figure out how to best organize this project for the team will help mitigate forgotten tasks and project delays. Whether it's a project management tool

or more simply an ongoing document, find a way for you and your team to stay on top of your project.

- **Break it down –** Sometimes projects or tasks will feel so large to the point of overwhelming. Break the task down into discrete tangible sub-tasks. Work from those sub-tasks to keep on top of all the moving parts.
- **Clear Communication and Expectations –** Clearly establish communication mechanisms for the team, along with roles. Who is responsible for which tasks? How often do you need to check-in as a team to ensure the project is moving along
- **Debrief the process –** Make it a habit to debrief the process throughout and at the end of projects, independently and with your collaborators. What worked? What could have been done differently to optimize group and task goals?
- **Explore something new –** It's easy to get stuck in our ways, even when it isn't proving to help us stay productive. Don't be afraid to try something new – a different project management tool, new way to discuss roles and expectations.

Also check out this amazing summary infographic of all the content from this chapter [that is available here](#) and at the end of this chapter.

Vignette Conclusion

The cherry tree outside their window is in full bloom.

"Something so refreshing about the spring." Dr. Yang thought to themselves.

Although it had been a busy few months, Dr. Yang noticed that her mind felt less cluttered and had been feeling a lot more manageable lately since she last did a self check-in. When things were becoming harder to navigate, Rayleen had reached out to some mentors for support who provided her with some considerations and tools to stay on top of their work. On top of using Trello to manage their projects with fellow collaborators, she had learned to break tasks down to make things feel more feasible, which has made projects more achievable. She had also been able to bring on board a research assistant to support two of their projects, who has been a significant help keeping the ball rolling.

While there are some things that can still be made more efficient – "Why are my files in so many different apps?!" – Dr. Yang would make it a point to do these check-in's quarter-annually to see how she can continue to build on the strategies to support their shared research endeavours.

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A QUICK GUIDE TO

Research Project Management

ORGANIZATION IS THE KEY TO SUCCESS

UNDERSTAND THE PROJECT

- What is the scope of the project? What are the **deadlines and outcomes** for the project?
- **Understand your institution**: what organizational bodies are involved in the review of this project (e.g. ethics, finance, departmental approvals)? Do they have timelines for their review processes?

TIMELINE & EXPECTATIONS

- For timelines, **work backwards.** Start from further deadlines (e.g. report back to granting agency) and plan checkpoints
- Allocate buffer room for any review processes (e.g. ethics, approval signatures)
- Use a **Gantt Chart** to layout project tasks
- Define **roles and expectations** for all team members involved (*be clear and proactive*)

PROJECT EXECUTION

- Use a **shared work space** (e.g. Dropbox) to keep files/folders organized (*date* all your documents!) & outline a **communication process** (e.g. Slack, email)
- Take **meeting minutes** to keep track of agendas and to-do lists!
- Look into **Project Management tools** (e.g. Trello, Asana, Basecamp) to create daily to-do lists and assign tasks – many are cross-compatible with other apps!

MONITOR PROGRESS

- Review your project progress charts/tools on a **routine** basis (e.g. daily, weekly)
- Have **team check-in meetings** to discuss progress and updates
- **Take a step back:** do tasks need to be re-assigned? Deadlines re-adjusted? New/changed objectives?

MANAGING MULTIPLE PROJECTS AT ONCE?

- **Don't re-Define the Wheel:** have templates for similar processes (e.g. ethics, grants, institutional forms) to refer back to
- **Build Rapport:** have a go-to person in each organizational body for urgent and/or more nuanced questions
- **Stay Organized:** keep one **macro-level tracking sheet** for all projects that you can review on a routine basis (e.g. monthly, quarter-annually). Use colours codes and other tags to keep it organized.

MERIT
MCMASTER EDUCATION RESEARCH, INNOVATION & THEORY

CREATED BY: MARK LEE,
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4-5 Planning Knowledge Translation and Dissemination Activities

TERESA CHAN AND SIRAJ MITHOOWANI

Overview

As with all applied sciences, our work as researchers is not done until the science we conduct is applied by the practitioners in our field. In health professions education research, this means that our frontline faculty who are teaching learners, designing assessments systems, improving curriculae, and leading programs need to be aware of the findings from our scholarship.

For those of you who are unfamiliar with the term Knowledge Translation (KT), it is a term that is used by the [Canadian Institutes of Health Research (CIHR)](#) to describe the activities that take research and translate it into products that ultimately help improve the health of Canadians. Examples of KT activities are: Knowledge synthesis; Dissemination; Application. In this chapter you will explore what KT might look like for you and your project(s).
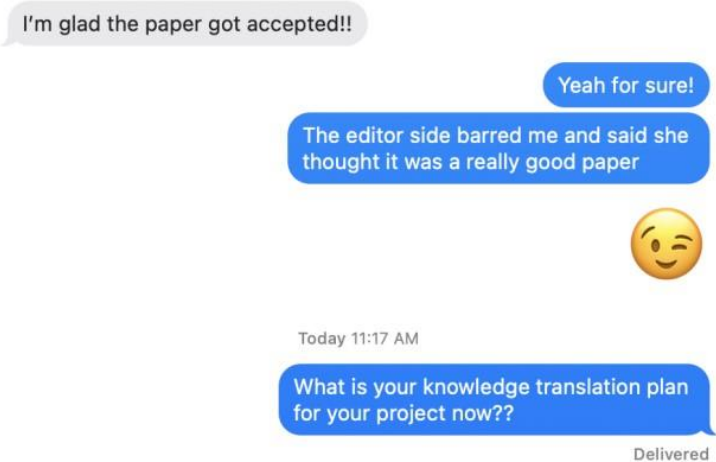
> ### Key Points of the Chapter
>
> In this chapter, participants will:
> - Compare and contrast knowledge translation and education.
> - Identify linkages and commonalities between knowledge translation, education, and other fields.
> - Name at least one new knowledge translation technique that they might apply to their practice.

Vignette

Nikhil was a junior health professions education scholar who had completed his research project on a curricular innovation within his residency program. He had just received a notification from the journal that his article had been accepted for publication!

Ecstatic, he emailed his mentor and the principal investigator for the project... She texted back the following:

I'm glad the paper got accepted!!

Yeah for sure!

The editor side barred me and said she thought it was a really good paper

😉

Today 11:17 AM

What is your knowledge translation plan for your project now??

Delivered

Nikhil took a quick breath. He had thought he was DONE, but now he had to do... what was that term again? Knowledge translation?

Through a quick internet search he found out that knowledge translation is when scientists disseminate their study's findings and/ or help others apply them in the real world.

He pondered his project. What would knowledge translation look like for this particular HPE project? What were things he could do to help people become aware of this paper? What could he do to help them better understand the findings and take-home points? And finally, could he find a way to make it easy for others to apply the findings of his study in their own contexts?

Deeper Dive into the Concept

Just like in other applied scientific sectors, the field of health professions education has a KT problem. In a video featuring Dr. Teresa Chan (See below video entitled *Social Media and the 21st Century Scholar*), learn about how we can integrate new strategies about KT broadly. In the video she highlights some personal experiences she has in applying novel techniques to translate the knowledge from her own research.

A YouTube element has been excluded from this version of the text. You can view it online here: https://books.macpfd.ca/ HPER-Primer/?p=127

The transfer of research findings into practice is often slow, haphazard and incomplete. Dr. Aliki Thomas' MERIT rounds video (entitled "Leveraging Knowledge Translation") describes this phenomenon and takes us through her perspective on how we might close the gap between knowing and doing.

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Knowing vs. Doing

The knowing-doing gap has long been acknowledged in many fields (1). What is most interesting within health professions education is that often our researchers are also excellent teachers themselves. So many health professions education researchers already have the necessary skill set to disseminate their research in interesting ways, engage their audience, and teach others how to adapt and to implement their research findings. As Dr. Thomas discusses in her presentation, KT is an active process of "making it happen" rather than "letting it happen". KT means tailoring research findings and their presentation to specific and relevant audiences to increase uptake and bridge the knowing-doing gap (2).

That being said, many can feel a bit embarrassed about KT efforts, worried about seeming like they're bragging about their work if they engage in social media-based dissemination (3). Still others may not think about how best to teach or communicate their research, feeling simply exhausted at the end of their hard work to get the

project published. Table 4.5.1 below summarizes some knowledge user groups in health professions education research.

Table 4.5.1. Potential Knowledge Users of Health Professions Education Research

Potential Knowledge User	Examples of end-of-grant KT	Examples of integrated KT
Clinical Teachers	Creating an infographic that summarizes your study findings – and then tweeting or publishing these so others can share, download, print, and post.	Consulting clinical teachers about common problems they have to determine and/or refine your research question about a clinical learning environment.
Students and trainees	Creating a workshop to present at conferences targeting trainee development around your topic.	Co-creating a podcast with trainees to highlight their stories and help them understand how the content applies to their context.
Educational administrators and policymakers	Disseminating a policy paper, end-of-grant report, or engaging in speaking engagements for educational administrators and policymakers.	Consulting these individuals during study design to refine processes or knowledge elicitation tools (e.g. surveys)
Educational organizations (e.g. Royal College of Physicians and Surgeons of Canada, College of Family Physicians of Canada, Resident Doctors of Canada)	Reaching out to professional organizations to promote your work on their magazines, podcasts, and blogs. Often these groups are hungry for relevant content, so this may be a great way to let people know you have work that is relevant to their membership.	Engaging in audit of practices aligned with the needs of educational organizations.

| Institutions (e.g. universities, teaching hospitals, clinics) | Sending copies of your paper with a short summary to key influencers or educational leadership within your institution. | Involving institutional leaders as key stakeholders for piloting a focus group or interview guide to ensure that the data collected will be relevant to institutional needs. |
| Whole Communities | Creating a public social media campaign that explains your research findings and how they can benefit communities. | Involving community members in determining the research question to ensure that it resonates with their needs. |

Frameworks for knowledge translation

In the videos above, Drs. Chan and Thomas review several conceptual frameworks for knowledge translation, including the Knowledge to Action cycle (4), Pathman's pipeline (5) and the Theoretical Domains framework (6). Here we will use a worked example to illustrate the Knowledge to Action (KTA) cycle (4).

Graham et al. (4) conceptualize the KTA cycle as a funnel of knowledge creation surrounded by an action cycle that facilitates uptake and application of that knowledge, as shown in Figure 4.5.1. Arrows are bidirectional suggesting that this is an iterative process and there may be feedback between the phases. Knowledge Inquiry sits at the top of the knowledge creation funnel. This represents unfiltered information of variable quality that is not ready for "prime time". Moving down the funnel, knowledge is sequentially refined and aggregated – first in the form of syntheses (e.g. meta-analyses) and then as end-user tools (e.g. checklists and guidelines). The action cycle begins by identifying a problem and selecting (and appraising) the appropriate knowledge to apply.
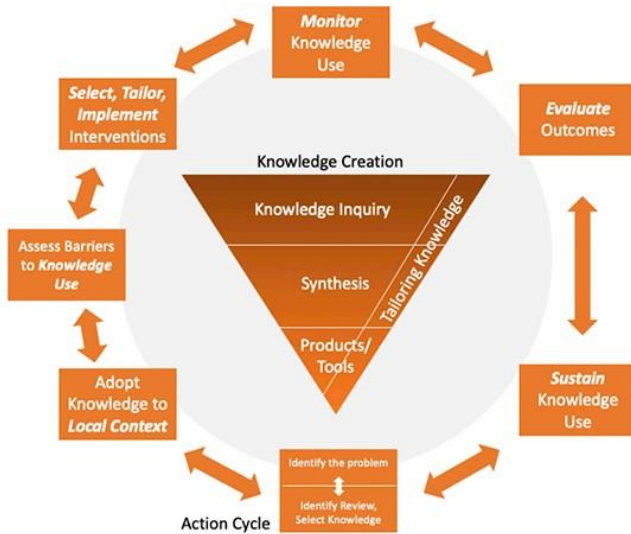
Figure 4.5.1: An adaptation of the Knowledge-To-Action Cycle

Generic knowledge is tailored to the local context, barriers to knowledge translation are analyzed, and interventions are planned that mitigate those barriers. The use of knowledge by end-users is evaluated along with any relevant educational or clinical outcomes (e.g. pass/fail rates for licensing exams). Finally, the cycle starts anew with a view toward sustaining and refining knowledge use.

Take for example the implementation of Competency by Design (CBD). CBD is a knowledge product co-developed by the Royal College of Physicians and Surgeons of Canada and its stakeholders that is rooted in educational theory including outcomes-based education, whole task learning and programmatic assessment. To implement CBD at the residency program level means moving through the Action Cycle.

- First, educational problems must be identified that justify the curriculum change; e.g. the lack of emphasis on direct observation and feedback in traditional residency programs.
- Implementation must then be adapted to the local context; e.g. programming assessment forms into MedSIS, which is the learning analytics platform in use by McMaster University.
- Barriers to knowledge use should be identified. In the case of CBD, faculty members might feel they lack sufficient time or knowledge to conduct regular direct observation and feedback in a busy clinical setting.

- Interventions should be designed to mitigate barriers, e.g. planning faculty development sessions, simplifying the process of documenting feedback through the use of checklists or software.
- Knowledge use can be monitored and evaluated by crosssectional surveys and focus groups consisting of faculty and learners. Educational outcomes of interest might include pass rates for licensing exams or other tests of performance (e.g. OSCE scores).
- Continuous evaluation of CBD processes and outcomes is required to sustain knowledge use.

The following summary diagram (Figure 4.5.2) can be a useful guide for those getting started in knowledge translation of their work for the first time.

Figure 4.5.2. A guide to thinking about knowledge translation for your work.

Examples of Knowledge Translation activities within Health Professions Education

The tables below (Box 4.5.1 and 4.5.2) describe two programs of research that has been used by two teams associated with one of our chapter co-authors (Dr. Teresa Chan) and her collaborators.

Box 4.5.1: The METRIQ study team

Research programme:
Measuring the impact and quality of social media educational resources.

Papers to be translated:
The METRIQ study research collaborative has published nearly 30 studies as a team about measuring impact and quality of online resources. They have a website that details their team, assists them with recruiting for their latest studies, and houses all of their research in a one stop shop.

Knowledge Synthesis Activities:
a) Rapid Review
Ting DK, Boreskie P, Luckett-Gatopoulos S, Gysel L, Lanktree MB, Chan TM. Quality appraisal and assurance techniques for free open access medical education (FOAM) resources: a rapid review. InSeminars in nephrology 2020 May 1 (Vol. 40, No. 3, pp. 309-319). WB Saunders.
https://www.sciencedirect.com/science/article/abs/pii/S0270929520300528b

b) Guideline Creation:
Members of this team have worked on a consensus guideline for applying this research to the Promotion & Tenure process: *Husain A, Repanshek Z, Singh M, Ankel F, Beck-Esmay J, Cabrera D, Chan TM, Cooney R, Gisondi M, Gottlieb M, Khadpe J. Consensus guidelines for digital scholarship in academic promotion. Western Journal of Emergency Medicine. 2020 Jul;21(4):883. doi:* 10.5811/westjem.2020.4.46441

Dissemination:
a) Website:
This team has both a website (which lists their teammates and their research papers) and a Twitter account that they use for recruitment AND dissemination. Website: https://metriqstudy.org/research-agenda

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b) Twitter Account: @METRIQstudy
This account assists with tweeting about their research and also helps with recruiting for their latest study.

You can read about these techniques in one of their methods papers:
Thoma B, Paddock M, Purdy E, Sherbino J, Milne WK, Siemens M, Petrusa E, Chan T. Leveraging a virtual community of practice to participate in a survey-based study: a description of the METRIQ study methodology. AEM education and training. 2017 Apr;1(2):110-3.
https://onlinelibrary.wiley.com/doi/full/10.1002/aet2.10013

c) Infographic Creation about their Articles:
Thoma B, Goerzen S, Horeczko T, Roland D, Tagg A, Chan TM, Bruijns S, Riddell J, METRIQ Podcast Study Collaborators. An international, interprofessional investigation of the self-reported podcast listening habits of emergency clinicians: A METRIQ Study. Canadian Journal of Emergency Medicine. 2020 Jan;22(1):112-7.
https://doi.org/10.1017/cem.2019.427

Example Infographic:

Application:
This team has engaged in a quality improvement cycle to make their critical appraisal tools more useful and into usable infographics and formats to help frontline teachers and trainees to determine the quality of online educational resources.

a) Revised METRIQ Score – Based on end-user feedback, this scoring tool was refined and simplified. For ease of use and adoption, a visually-appealing scoring rubric was created for this revision and can be found within the paper.
Paper & link: *Colmers-Gray IN, Krishnan K, Chan TM, Trueger NS, Paddock M, Grock A, Zaver F, Thoma B. The revised METRIQ score: a quality evaluation tool for online educational resources. AEM education and training. 2019 Oct;3(4):387-92.* https://onlinelibrary.wiley.com/doi/abs/10.1002/aet2.10376

b) Revised AIR Score - Same as above, the AIR score which was previously studied by the group was also revised and redesigned with a new user-friendly rubric.
Paper & link: *Grock A, Jordan J, Zaver F, Colmers-Gray IN, Krishnan K, Chan T, Thoma B, Alexander C, Alkhalifah M, Almehlisi AS, Alqahtani S. The revised Approved Instructional Resources score: An improved quality evaluation tool for online educational resources. AEM Education and Training. 2021 May 16:e10601.* https://onlinelibrary.wiley.com/doi/abs/10.1002/aet2.10601

c) Systematic Review of Open Access Educational Resources – The above tools enabled members of the METRIQ team to engage in a first-of-its-kind systematic review of open access resources. The scoring tool was used as a quality filter for the resources to identify high-quality resources for teachers to use in their curriculae.
Paper & link: *Grock A, Bhalerao A, Chan TM, Thoma B, Wescott AB, Trueger NS. Systematic Online Academic Resource (SOAR) review: renal and genitourinary. AEM education and training. 2019 Oct;3(4):375-86.* https://onlinelibrary.wiley.com/doi/abs/10.1002/aet2.10351

Box 4.5.2: Multipatient Environments & the GridlockED game

4.5.2: Multipatient Environments & the GridlockED game

Research programme:

Clinical care and diagnostic reasoning within multipatient environment settings.

Papers to be translated:

This group had three main papers that were part of a small programme of research that became the fodder for knowledge translation.

- *Chan, T.M., Van Dewark, K., Sherbino, J., Schwartz, A., Norman, G. and Lineberry, M., 2017. Failure to flow: An exploration of learning and teaching in busy, multi-patient environments using an interpretive description method. Perspectives on medical education, 6(6), pp.380-387.*
- *Chan TM, Mercuri M, Van Dewark K, Sherbino J, Schwartz A, Norman G, Lineberry M. Managing multiplicity: conceptualizing physician cognition in multipatient environments. Academic Medicine. 2018 May 1;93(5):786-93.*
- *Chan, T.M., Van Dewark, K., Sherbino, J. and Lineberry, M., 2019. Coaching for chaos: a qualitative study of instructional methods for multipatient management in the emergency department. AEM education and training, 3(2), pp.145-155.*

Knowledge Synthesis Activities:

This team has engaged in a few different knowledge syntheses:

a) Blog posts summarizing their program of research

b) A blog post that summarizes key findings from the papers into a more user-friendly read for frontline practitioners (teachers and students)

c) A summary paper for a national journal about the key take-home points for frontline teachers to use when teaching about multipatient environments:

> *Chan TM, Sherbino J, Welsher A, Chorley A, Pardhan A. Just the Facts: how to teach emergency department flow management. Canadian Journal of Emergency Medicine. 2020 Jul;22(4):459-62.*
> *https://doi.org/10.1017/cem.2020.32*

Dissemination:

The authorship team has linked up with the publishing journals to generate tweets to highlight the work when it was finally published.

AEMETOnline @AEM_ETOnline · Jan 15, 2019

Teaching in EM is different than outpatient clinics, hospital wards, or operating rooms. This paper explores strategies EP-teachers use in unpredictable, overcrowded, complex, **multi-patient environments**. from @TChanMD @sherbino @TestTransformed

onlinelibrary.wiley.com/doi/10.1002/ae...

ORIGINAL CONTRIBUTION

Coaching for Chaos: A Qualitative Study of Instructional Methods for Multipatient Management in the Emergency Department

Teresa M. Chan, MD, MHPE, Kenneth Van Dewark, MD, MEd, Jonathan Sherbino, MD, MEd, and Matthew Lineberry, PhD

ABSTRACT

Background: Busy environments, like the emergency department (ED), require teachers to develop instructional strategies for coaching trainees to function within these same environments. Few studies have documented the strategies used by emergency physician (EP)-teachers within these busy, chaotic environments, instead emphasizing teaching in more predictable environments such as the outpatient clinic, hospital wards, or operating room. The authors sought to discover what strategies EP-teachers were using and what trainees recalled experiencing when learning to handle these unpredictable, overcrowded, complex, multipatient environments.

Method: An interpretive description study was conducted at multiple teaching hospitals affiliated with McMaster University from July 2014 to May 2015. Participants (10 ED teachers and 10 junior residents) were asked to enroll

♡   ⟲ 28   ♡ 37   ⬆

Academic Medicine @AcadMedJournal · Jan 27, 2018

Managing Multiplicity: Conceptualizing Physician Cognition in **Multi-Patient Environments**: Drs seek to develop a conceptual framework to describe how emergency #physicians think in busy, multi-#patient environments: ow.ly/QctY30hBPtK. #MedEd

♡   ⟲ 12   ♡ 20   ⬆

Application:

This program of research spurred on the creation of a serious game entitled GridlockED (gridlockedgame.com). It allows for teachers and/or trainees to engage with the concepts of multi-patient environments in a safe, low-stakes environment (e.g. a board game).

Interestingly, the creation of this game also triggered its own follow-up research and scholarship.

- Tsoy D, Sneath P, Rempel J, Huang S, Bodnariuc N, Mercuri M, Pardhan A, Chan TM. Creating GridlockED: A serious game for teaching about multipatient environments. Academic Medicine. 2019 Jan 1;94(1):66-70.

- Brar G, Lambert S, Huang S, Dang R, Chan TM. Using Observation to Determine Teachable Moments Within a Serious Game: A GridlockED as Medical Education (GAME) Study. AEM education and training. 2021 Apr;5(2):e10456.

- Hale SJ, Wakeling S, Bhalerao A, Balakumaran J, Huang S, Mondoux S, Blain JB, Chan TM. Feeling the flow with a serious game workshop: GridlockED as Medical Education 2 study (GAME2 study). AEM Education and Training. 2021 Jul;5(3):e10576.

- Hale SJ, Wakeling S, Blain JB, Pardhan A, Mondoux S, Chan TM. Side effects may include fun: Pre-and post-market surveillance of the GridlockED serious game. Simulation & Gaming. 2020 Jun;51(3):365-77.

In summary, when engaging in knowledge translation of health professions education research, we must consider the following:

- **Discern and construct a dissemination plan with your target knowledge users in mind –** Make sure that you consider those who are your target audience for your study.
- **Consider harnessing the power of non-traditional media (e.g. social media, podcasting, blogging) –** Most researchers in the health professions do not have access to professionals who can help them generate press releases and newsworthy buzz around their papers. As such, it is useful to create your own buzz. Consider using non-traditional media such as social media (e.g. Twitter, Instagram), podcasting, or blogging to get the word out. Funny enough, sometimes your social media content will generate the biggest buzz.
- **Make application easy –** If you have a new finding that should change practice try to find a way to make things easy. Consider creating infographics, checklists or other tools. Consider the "outer ring" of the Knowledge-to-action cycle and think through how you might create knowledge products or tools that help frontline knowledge users to engage with your new knowledge.

Vignette Conclusion

Nikhil paused to reflect on his KT plan and comes to realized that there was a lot of work ahead to turn research into action. He considered his target knowledge users: what would residents and faculty members want to know about his innovation?

Nikhil began synthesizing his work in a series of blog posts for professional societies within his specialty and worked with a team of medical students to develop easy-to-digest infographics that conveyed the paper's key points. He used Twitter to craft a 'tweetorial ' on his key findings and tagged his co-authors, key influencers within health professions education research, and the journal that published his paper to start a buzz about his recent research paper. Finally, he met with his mentor and Program Director to create a strategy for local implementation. His mentor reminded him that he would need to adapt his research findings to fit their institution's needs and available resources.

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4-6 Design-Based Research in Health Professions Education

ARIANNA MAZZEO AND TERESA CHAN

Overview

Design fiction can be harnessed as a methodology to help elicit needs and engage in futurism. Aligned with applied research techniques such as design-based research, practitioners aim to exploring and criticizing possible futures by creating speculative scenarios narrated through designed artifacts. Design-based methodology allows researchers to go beyond simply studying a phenomenon or an outcome - instead, it encourages researchers to think and act like designers by engage knowledge end-users via meaningful interactions (discussion, observation, etc..) and using insights from these interactions to create better outputs that can be used to assist with knowledge translation.

Key Points of the Chapter

By the end of this chapter the learner should be able to:

1. Describe design-based research methodologies and how they might be used in their health professions education research.
2. Use design principles and tools to discover new research opportunities and questions.

Vignette

Andy, a lecturer in the Faculty of Health Sciences, was attending a technology conference. While wandering the exhibit hall between sessions, he found himself drawn to the vendor booth of an AR/VR technologies firm that he'd been following since has a trainee. His old friend, and former fellow postdoctoral fellow Devin was stationed at the booth and waved at Andy.

"Hi there Andy! It's been a while... I hope you're doing well?"

"I've been well... Survived the pandemic and got myself a job as a lecturer at our old alma mater. To be honest, I've been watching your career for a while and been quite proud of your success. It's been very cool to see your start-up take off! Virtual reality and augmented reality are now so trendy. But I didn't know you were trying to make a play into health professions education... Honestly, do you see a lot of applications in health professions education?"

"We are gaining marketshare in customizing content for immersive environments," replied Devin. "That said, we don't have much a presence in health professions education right now. Would you be interested in partnering with us to engage in research around the use of some of our new technologies?"

Andy scratched his head. He wasn't really sure how augmented reality/virtual reality (or as the students often called it, "AR/VR") could really be used yet, but perhaps it would be clearer if he asked a few more questions. He asked: "I don't have a lot of budget to build AR/VR type immersive environments yet. I mean, we could certainly partner to see if we could get some grants to develop these, but that might take a while. Are there a low stakes way to engage in developing possible research applications without having to know how to program? I've been quite intrigued by this

whole space, but I'm not 100% sure how we would use it in my area yet. Maybe we could use fictional personas and some design-based research techniques to develop these ideas out? What do you think?"

Now it was Devin turn to be confused. "What is a fictional persona? An actor?"

"A persona is a fictional character which you create based upon your research in order to represent the different user types that might use your service, product, site, or brand in a similar way. Creating personas helps the designer, in particular, of your VR/AR technology to understand users' needs, experiences, behaviours and goals."

"Ok! Yes... That is fascinating. Definitely could partner with you to employ personas and fictional characters to flesh this out. Let's explore this more!"

Deeper Dive into this Concept

Design-Based Research (DBR) is a methodological framework used by researchers in the learning sciences, as applied methodology to teach and learn in education (1-3). The basic process of DBR involves developing solutions, called *design interventions*, for complex and systemic problems. Then, the *design interventions* are put to use to test how well they work and further refined. Through iterations, these interventions can be adapted and re-tested to gather more data. The purpose of this approach is to generate new theories and frameworks for conceptualizing learning, instruction, design processes, and educational learning innovation for complex societal problems.

The merits of the DBR methodology to research interventional designs to change learning environments have contributed to significant understanding and development of Healthcare educational practice. As a change methodology, DBR is well-suited for inquiry beyond the evaluation of teaching and learning environments.

The rationale for using DBR-type methodologies would be to better integrate discovery scholarship with application scholarship. First, the future is uncertain and unpredictable, and yet, we can be fairly certain that for HPE the future will continue to unfold and be unknown. The forces shaping the future will emerge unevenly across geographies, industries and populations, and DBR allows HPE researchers to tap into the creative parts of their process to engage in foresight and change that is ahead of the curve. The decisions we make today will play out in the future – and not always as intended – in a world that is complex, diverse and dynamic. DBR is a useful tool for both researchers and innovators alike, among other strategies for engaging in strategic foresight and other futurist strategies.

Similarities to Other Approaches

For those familiar with quality improvement and program evaluation, this iterative approach may feel similar to concepts such as the Plan-Do-Study-Act (PDSA) approach (4) or a Continuous Quality Improvement (CQI) cycle for an educational program (5). It is also notable that the act of engaging stakeholders in co-design via cyclical iterations of consultation will have shades of overlap with participatory action research and other forms of stakeholder consultation processes that are increasingly employed in clinical research. There are extensive overlaps between DBR and design thinking (which is an increasingly popular technique for determining educational needs (6)). In fact, the overlap is so extensive that in many circles DBR and design thinking are thought of interchangeably.

Personas & Scenarios

Personas are fictional cases that act as exemplars and archetypes for the design challenge. These personas are often developed with some basic demographic details – enough so that the participants in the design challenge can engage with the persona, but not so detailed that they are daunted by the intricacies of the case.

Classically, the personas are then placed in various situations to develop scenarios. Scenarios are stories about how the future might unfold for an organization, a community, a nation or even the world. Scenarios are anchored by an important exploratory or strategic question (e.g. What is the future of artificial intelligence in health professions education? Should we build an online medicine program in Tunisia?). Scenarios are created and used in sets of three or four to express a range of future possibilities, undergirded by major uncertainties that are critical to the focal question. Good scenarios for health education are both provocative and plausible. They are hypotheses, not predictions. Scenarios usually tell a story looking back from some point in the future – most often 10 years out. Scenarios can be descriptive or character-driven. As a set, the scenarios describe how and why particular futures have unfolded in ways that are meaningfully different from one another. This technique can help to generate foresight into possible futures, and help you to anticipate pain points or problems before they happen. An example of this can be found in a recent commentary paper within *Academic Medicine* where authors anticipated multiple possible futures for the use (or misuse) of learning analytics in the near future (6).

Examples of application of Design Based Research in Health Professions Education

Dr. Brent Thoma and his team have used Design-Based Research (DBR) in the creation of several dashboard visualization tools to assist educators and trainees in the age of Competency-Based Medical Education (7). From this teams' work, we can better understand how Competence Committees need to visualize learner assessment data effectively to support their decision making. Dashboards play an integral role in decision support systems in other fields. DBR allows the simultaneous development and study of educational environments.

Thoma's team used a DBR process within the emergency medicine residency program at the University of Saskatchewan to identify the data, analytics, and visualizations needed by its Competence Committee, and developed a dashboard incorporating these elements (7). Narrative data were collected from two focus groups, five interviews, and the observation of two Competence Committee meetings (7). Data were qualitatively analyzed to develop a thematic framework outlining the needs of the Competence Committee and to inform the development of the dashboard (7). This team has also used DBR to elucidate the needs of trainees (8) and also those of faculty developers (9) who might be able to use this data in new ways.

In addition, there are several ways that DBR can be used in HPE research and scholarship. See Table 4.6.1 for cases examples of how DBR can be used to enhance the ways in which scientists can engage with end-users to close the knowledge translation gap, but also engage in methods to change their research course with stakeholder consultation.

Table 4.6.1: Examples of Design Based Research in Health Professions Education Research (11-15)

Phase of Research	Use Case	Example of an HPER project
1.Before you start designing a project or program	a) Identifying end-user pain points	Chan TM, Mercuri M, Turcotte M, Gardiner E, Sherbino J, de Wit K. Making decisions in the era of the clinical decision rule: how emergency physicians use clinical decision rules. Academic Medicine. 2020 Aug 1;95(8):1230-7. https://doi.org/10.1097/ACM.0000000000003098 (11)
	b) Determine new research directions such as new clinical implementation strategies	Kamhawy R, Chan TM, Mondoux S. Enabling positive practice improvement through data-driven feedback: A model for understanding how data and self-perception lead to practice change. Journal of Evaluation in Clinical Practice. 2021 Aug;27(4):917-25. https://onlinelibrary.wiley.com/doi/abs/10.1111/jep.13504 (12)
2. Needs Assessment for Designing a new Product or Service	Identifying needs of your target audience or end-users	Munford V. Designing a centralized faculty performance dashboard: Optimizing feedback and scholarly data reporting. Thesis. eHealth Program; McMaster University. 2021. https://macsphere.mcmaster.ca/bitstream/11375/27045/2/Munford_Vanessa_2021Sept_eHealth.pdf (13)
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3. For stakeholder consultation to ensure research is relevant	Knowledge user engagement strategy for facilitating improved end-of-project knowledge uptake	Zarabi S, Chan TM, Mercuri M, Kearon C, Turcotte M, Grusko E, Barbic D, Varner C, Bridges E, Houston R, Eagles D. Physician choices in pulmonary embolism testing. CMAJ. 2021 Jan 11;193(2):E38-46. https://www.cmaj.ca/content/193/2/E38.abstract (15)
4. To engage in evaluation of a project/program/service	Auditing existing resources within a program	The McMaster Program for Faculty Development Faculty Journey Vignette Project (https://journey.macpfd.ca)

5. Iterative, Co-Design of an Education Product	Improving Knowledge User & Stakeholder Engagement via early involvement and active co-design.	Thoma B, Bandi V, Carey R, Mondal D, Woods R, Martin L, Chan T. Developing a dashboard to meet Competence Committee needs: a design-based research project. Canadian medical education journal. 2020 Mar;11(1):e16. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7749685/ (8) Carey R, Wilson G, Bandi V, Mondal D, Martin LJ, Woods R, Chan T, Thoma B. Developing a dashboard to meet the needs of residents in a competency-based training program: A design-based research project. Canadian Medical Education Journal. 2020 Dec;11(6):e31. https://www.ncbi.nlm.nih.gov/pmc/articles/pmc7082472/ (9) Yilmaz Y, Carey R, Chan TM, Bandi V, Wang S, Woods RA, Mondal D, Thoma B. Developing a dashboard for faculty development in competency-based training programs: a design-based research project. Canadian Medical Education Journal. 2021;12(4):48-64. https://europepmc.org/article/med/34567305 (10)

Key Takeaways

- **Be concise.** Brevity is the soul of wit and describing the scenario or using visuals to help and share your idea.
- **Be culturally and socially appropriate and sensitive.** Make sure that your characters/situations avoid cultural stereotypes. Vignette stories and language should be checked for bias, encourage participants to lay aside their innate judgement. Ensure that you avoid racist or discriminatory lexicon at all times.
- **Have fun and enjoy the journey.**

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