EDITORIAL OPEN ACCESS

Making Research More Accessible: The Research Empowerment & Development (RED) Fellowship Program

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Abstract
As individuals interested in clinical and medical research, we have observed an increasing need for methodological research skills by grassroots, not-for-profit, and for-profit organizations. However, research methodology skills and resources are often available only in post-secondary institutions (i.e., graduate programs and communities of practice). Undergraduate learners often face the challenge of accessing post-graduate research training. This guest editorial describes the Research Empowerment & Development (RED) Fellowship, a six-week collaborative program that aims to build capacity in individuals to conduct, develop, and implement high-quality research. This editorial will discuss the rationale for this program, the program plan, program design process, target audience, program timeline, future goals, and contact information.

Keywords: research; protocol development; proposal development; research methodology; program design; undergraduate research; graduate research; epidemiology; health services research; teaching and learning

Introduction

Clinical and medical research has shaped our world for the better. However, it has become increasingly harder to access skills to conduct research. As individuals interested in clinical and medical research, the authors have observed an increasing need for research methodological skills by grassroots, start-up, not-for-profit, and for-profit organizations. However, research methodology skills and resources are often available only in post-secondary institutions (i.e., graduate programs and communities of practice). To access necessary skills and resources, organizations have to access graduate programs and communities of practice, which have limited enrolment and require a considerable level of financial investment.

In Toronto, Canada, multiple institutions offer an array of learning opportunities on research methodology: Toronto General Hospital Multi-Organ Transplant Student Research Training Program by the University Health Network, SRI Summer Student Research Program by Sunnybrook Research Institute, Hurvitz Brain Sciences Summer Student Research Program by Sunnybrook Research Institute, SickKids Summer Research Program by SickKids Hospital, Qualitative Research Refined: Design / Execution / Analysis by The Wilson Centre at University Health Network, and Clarifying Methodologies for Health Professions Education Research by The Wilson Centre at University Health Network. However, these programs are restricted to certain groups (e.g., high school students, students at the particular institution, or healthcare professionals), or the program is limited in scope (i.e., emphasis on quantitative methodology or qualitative methodology, but not both). There is a need to develop programs that are accessible to a wider range of individuals and include a broader scope of knowledge and skills related to research methodology.

Grassroots, start-up, not-for-profit, and for-profit organizations require research for different reasons. In some cases, research is used to determine the effectiveness of programs being implemented in communities. In other cases, research is used to legitimize an organization's initiatives to seek additional funding and resources. These objec-

tives are important to the functioning of organizations and make it imperative to provide an avenue through which organizations are able to conduct high-quality and rigorous research outside of traditional avenues. As such, there is a strong need to make research and methodology more accessible to organizations.

The Research Empowerment & Development (RED) Fellowship - a collaborative initiative between the Undergraduate Research in Natural and Clinical Science and Technology (URNCST) Journal and The Methodologist (TMT) - aims to deliver a six-week program that builds capacity in individuals to conduct, develop, and implement high-quality research. The URNCST Journal is a Canadian publisher that offers a unique platform for undergraduate students to publish their research from abstracts presented at research conferences internationally. This journal primarily focuses on publishing abstract books from conferences around the world. TMT is an organization that attracts and connects academics, learners, and investigators with an interest in enhancing research methodology to equip them with resources and training to become proficient, ethical, and responsible researchers. This editorial will discuss the structure, design, and delivery of the RED Fellowship program.

Components of the Research Empowerment & Development (RED) Fellowship Program

The RED Fellowship program consists of two active learning workshops and one mentorship session with an experienced research methodologist each week for a total of six weeks. The purpose of the workshops is to provide learners with the knowledge and skills to design their own research project in an area of interest. Selected topics covered in the workshops will guide learners through the different stages they will encounter when designing a research study. Mentorship sessions will give learners the opportunity to develop and consult an expert on a study protocol for a question they formulate that is relevant to their professional learning context. Every week, learners will write a component of their protocol concurrent to the pertaining workshop topics. Table 1 shows an abridged version of the draft program plan. The program aims to challenge individuals to think proactively about the details of research methodology and encourage the skill of self-directed learning. Through research training workshops, one-on-one mentoring sessions, and classroom assessment strategies, learners will acquire the knowledge, skills, and attributes to design authentic, high-quality, meaningful, and rigorous research projects in professional practice.

The goals are to build capacity in individuals outside of traditional avenues of research to conduct high-quality research, create opportunities in organizations to facilitate learners' abilities to utilize and conduct meaningful research, and address the gap between the skills required to carry out rigorous research and access to essential methodological resources. The RED Fellowship aims to empower students and employees of various organizations to design, conduct, appraise, and disseminate rigorous research, which in turn will build capacity in for-profit and not-for-profit organizations. These objectives will be achieved by targeting six areas of research and methodology: study design, epidemiology, statistical data analysis, appraisal, ethics, and scholarly writing (see Figure 1).

The objectives of RED are to:

1. Build capacity within learners to conduct high-quality research by actively supporting them to navigate the complexities of research methodology theory and practice
2. Create opportunities in organizations to facilitate and enhance learners' abilities to carry out meaningful, useful, and rigorous research
3. Bridge the gap between the skills required to conduct research and access to essential methodological resources

Program Design Process

The RED Fellowship program was designed using evidence-based principles in curriculum/program design, educational development, and inquiry-based learning (IBL). The workshops are interactive, hands-on, and guided by active learning strategies. Learners will explore foundational concepts of research methodology and apply these concepts in activities that test their assumptions and expand their conceptualizations of research.

The majority of time spent in workshops will be allocated to engaging in activities that focus on active learning, which are characterized by *doing* and *reflecting*. In *doing*, learners will participate in a classroom assessment activity relevant to research methodology and protocol development. For example, in a workshop on qualitative research, learners will engage in a Gallery Walk where they circulate through four or more flipchart papers with case studies describing a qualitative research design. At each station, groups of learners will reflect on the nuances of the case study, choose a qualitative methodology appropriate to that study, and justify that methodology. Throughout this activity, learners will participate in collaborative inquiry and knowledge-building to examine the subtleties of various qualitative methodologies and the contexts in which they are most suitable. In this way, learners will be better equipped to deploy a range of qualitative methodologies to match the context, situation, and research problem. Subsequent to the activity, learners will reflect on the implications of the activity and how it applies to their research practice. Activities such as this one are representative of the efforts by URNCST Journal and TMT to make research and research methodology more accessible to a wider range of groups (see, for example, [1-5]).

Active learning complements with IBL, which is a curriculum design framework guided by problems, and finding solutions to those problems [6]. In this context, IBL is ori-

ented to the research problems relevant to learners' professional context; and the assumptions, values, and norms that define these problems. Learning activities use IBL through the conceptualization and operationalization of problems [7]. In addition to these principles and curriculum framework, the mentorship sessions exemplify promising practices in peer mentorship, most notably, mentorship models that represent shared power, accountability, and responsibility [8]. The mentorship model that guides the RED Fellowship program is guided by social constructivism and connectivism philosophies of knowledge [9]. One aspect of these philosophies is that learners *influence* and *are influenced* by the content and learning process. This bidirectional relationship between the learner and content also applies to the mentor-mentee relationship; both individuals influence and are influenced by one other. This approach is advantageous for what the RED Fellowship program intends to achieve because it encourages learners to create, generate, expand, and apply their knowledge as it is assimilated into existing knowledge structures. This dynamic process of knowledge formation and application emerges from a changing, authentic, and mutually-beneficial relationship between the mentor and mentee.

Six program designers and outreach coordinators worked in collaboration to design this program, under the guidance of a research methodologist and program designer (UM) who has extensive experience in these areas. UM has co-designed and evaluated multiple programs at institutions, organizations, and communities. The RED program converges his experiences in research methodology and educational development.

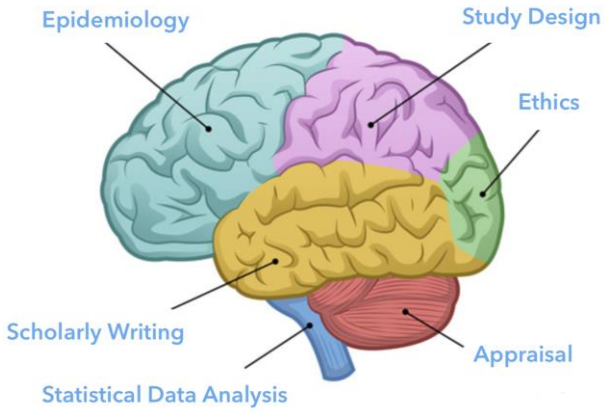

Figure 1: Core components of the RED Fellowship program

Table 1: RED Fellowship Program Plan

Week	Intended Learning Outcomes	Topics
1	• Differentiate between the three paradigms of research • Differentiate between observational and experimental study designs in clinical and health services research • Describe the features of different observational and experimental study designs • Design effective and encompassing research questions for health services and epidemiological research	• Research methods and design • Writing a literature review • Writing a research proposal • Designing good research questions and objectives • Justifying the choice of study design • Coherence between different sections of a research protocol
2	• Differentiate between variables, outcomes, and relationships pertaining to research studies • Identify some properties of clear and effective outcomes for clinical research studies • Apply the concepts of validity and reliability into research practice • Identify different approaches to sampling and recruiting potential participants for a specific research study	• Variables, outcomes, and relationships • Sampling and recruitment strategies • Justifying sampling and recruitment strategies • Coherence between different sections of a research protocol
3	• Define the following: clinical epidemiology, and health services research. • Differentiate between association and causation in epidemiology • Apply the social determinants of health to the well-being of populations and epidemiology of diseases and medical conditions	• Epidemiology • Health services research • Health policy research • Social determinants of health
4	• Differentiate between methodology and data collection methods used in research • Appraise the advantages and disadvantages of various data collec-	• Data collection strategies • Statistics • Data analysis plans and procedures

	tion methods • Describe the importance and use of p-value and confidence intervals in statistical hypothesis testing • Apply a t- or z-score test for significance to independent or paired samples	• Data management • Coherence between different sections of a research protocol
5	• Apply the principles of research ethics to clinical and health services research practice • Identify the key components of informed consent required in research studies involving human participants • Delineate between the philosophical foundations of qualitative and quantitative inquiry • Differentiate between the objectives and circumstances in which qualitative methodologies may be employed	• Ethics • Informed consent • Research Ethics Board applications • Qualitative research • Philosophies of research • Coherence between different sections of a research protocol
6	• Identify the different types of biases within research • Reflect on the influence of biases in clinical research • Appraise the different components of research studies and research proposals	• Critical appraisal • Threats to validity • Collaboration in research • Research bias

Target Audience

This program is suitable for students and future researchers (current or past students, employees, and leaders) from all backgrounds who are looking to improve their research methodology skills through an interactive and hands-on approach. Individuals working in for-profit and not-for-profit organizations, start-up companies, or students are cordially invited to sign-up for this program. The program provides the tools that learners and employees will need to successfully conduct research in their professional or academic careers. This program uniquely imparts a hands-on approach to thoroughly examine six aspects of research methodology in a condensed time frame. These aspects - epidemiology, study design, ethics, scholarly writing, statistical data analysis, and appraisal (See Figure 1) - are covered extensively by professionals through active learning activities and IBL. Learners will gain confidence in research by exploring new topics, and applying learnt concepts to activities during weekly workshops. One-on-one mentorship meetings with research methodologists are also facilitated to supplement learning, and support students to develop a research protocol in an area of their interest. The skills learned in these six weeks can be applied to diverse careers and roles. Individuals who succeed in completing this program will receive a Certificate of Completion that they can use for research positions, academic programs, and many other endeavors.

Future Goals

The RED Fellowship program aims to connect researchers and learners of research together to promote ethical, rigorous, and meaningful research. As such, the program will provide useful, transferable skills that will enable individuals to conduct high-quality research in their professional contexts. The RED Fellowship program envisions to become successful nationally and internationally.

List of Abbreviations

RED: Research Empowerment & Development
URNCST: Undergraduate Research in Natural and Clinical Science and Technology Journal
TMT: The Methodologist
IBL: Inquiry-based learning

Conflicts of Interest

The author(s) declare that they are members of the team that is designed the Research Empowerment & Development (RED) Fellowship program. All authors are not employed by either URNCST or TMT.

Ethics Approval and/or Participant Consent

N/A

Authors' Contributions

MM: made contributions to the design of the study, drafted the manuscript, and gave final approval of the version to be published.
MD: made contributions to the design of the study, drafted the manuscript, and gave final approval of the version to be published.
RP: made contributions to the design of the study, drafted the manuscript, and gave final approval of the version to be published.
ER: drafted the manuscript and gave final approval of the version to be published.
RN: drafted the manuscript and gave final approval of the version to be published.

UM: made substantial contributions to the design of the study, revised the manuscript critically, and gave final approval of the version to be published.

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