Educational Research:

A Practical Guide

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Contents

Educational Research in Higher Education

The Centre for Teaching & Learning offers support and resources to individuals and research groups engaging in educational research, also referred to as the Scholarship of Teaching and Learning. Assistance is provided with:

- Scanning the research literature to locate examples of studies in your area of interest in order to provide background context and research approaches for your study.
- Reviewing grants and awards that are available for educational research and completing the required forms.
  Reviewing the ethics review process and requirements for Queen's General Research Ethics Board.

The Purpose of Educational Research

Educational research "... aims to bring a scholarly lens—the curiosity, the inquiry, the rigor, the disciplinary variety—to what happens in the classroom... [It] begins with intellectual curiosity, is conducted deliberately and systematically, is grounded in an analysis of some evidence, and results in findings shared with peers to be reviewed and to expand a knowledge base." (Nancy Chick, Vanderbilt Center for Teaching). The reasons for pursuing educational research are to:

- Examine your classroom practice through a systematic process of inquiry.
- Record successes and failures with the goal of improving student learning and teaching practice.
- Reflect on findings in relation to existing educational research literature.
- Validate your teaching practice and build theory relating to educational approaches.
- Share and disseminate experiences to build upon what we know about teaching and learning processes.

Educational Research Process

Educational research is a cyclical and iterative process where one stage informs the next. As with any research project, new information and learning at each stage influences previous and subsequent steps which can lead to changes in the research question and the research design. This image reflects stages in the Educational Research Process

**Stages in the
Educational Research Process**

Recognize and formulate questions

Research the education literature

Design approach & select methods

Complete ethics review if necessary

Gather data & complete analysis

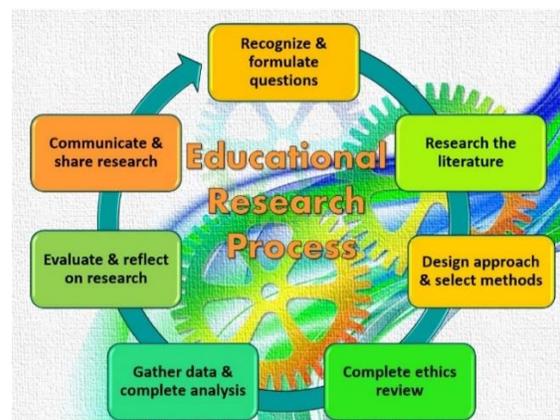Evaluate & reflect on research

Communicate & share research

Image: C. Laverty

Recognize and Formulate Questions

Classroom events often provide a trigger for educational research. You may observe that students find particular concepts difficult to grasp and become aware that students are not prepared to engage in class discussions because they have not read required readings. You want to learn more about how group work or team-based learning influences student achievement.

The first step is to describe what you see in your own or your students' behaviour that you wish to better understand or change. Your statement should set up the general parameters or boundaries of the research by explaining your classroom context, why the study is needed, and its overall significance and purpose. From here, you can move on to formulating specific research questions.

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In their guide to educational research (Elgie, S., Childs, R., Fenton, N., Levy, B. A., Lopes, V., Szala-Meneok, K., & Wiggers, R. D. (2012). Researching Teaching and Student Outcomes in Postsecondary Education: A Guide. Toronto: Higher Education Quality Council of Ontario), four directions guiding the purpose of a study are identified.

Directions for Guiding Research Purpose Statements	
Exploratory To gain insight into a phenomenon in order to study it further.	Review the literature to learn about a new area. What does active learning look like in an environmental studies classroom?
Descriptive To describe a situation, group, sample or population.	Not seeking evidence of effectiveness. How do students prefer to learn anatomy content? What are student misconceptions about this topic?
Relational To find out how two or more variables or themes are related.	Seeking evidence that demonstrates relationships. What is the relationship between gender and attitudes towards inquiry-based projects?
Explanatory To derive casual assertions or inferences.	Seeking evidence explaining the effectiveness of a teaching or learning strategy. What types of online discussion questions spark the most student engagement? Will assigning a metacognitive activity for homework improve problem-solving ability?

Carefully crafted research questions are a prerequisite for a well-aligned research design. There are usually three types of research questions: what, how, and why (Blaikie, 2010).

Examples of What, Why, and How Questions	
What	Questions address the effectiveness of specific teaching approaches or technologies, the characteristics of an activity, or new approaches (e.g. team-based learning, teaching core content from a different perspective) What were students' perceptions of the learning benefits of the peer review process?
How	Examines how certain processes are used or how outcomes can be changed. How did participation in peer review influence student writing processes?
Why	Explores the causes of, or reasons for, certain characteristics or patterns, or to understand relationships within activities or processes. Why does peer review work well in my fourth-year class but not in my first-year class?

To begin identifying your questions, consider the following process for formulating research questions (adapted from Blaikie, Norman. 2010. Designing Social Research. Malden, MA: Polity Press).

- Write down every question you can think of related to the problem
- Review your list: group the questions under themes and set aside questions that are outside your main area of interest.
- Separate the What, How, and Why questions.
- Make sure each question is clearly and simply stated, is open-ended, and is unambiguously in the What, How, or Why category.
- Narrow the focus to only those questions which can be reasonably tackled within the project.
- Separate major and subsidiary questions.
- Operationalize any theoretical or technical terms that you have used in your questions.

Examples of Research Questions
Engineering Scenario Researchers wanted to examine the impact of a peer review process on the research and design projects in a first-year engineering class of 82 students. Students reviewed the work of two peers and then applied the same criteria to review their own project. Research Questions a. What were students' experiences of and attitudes to peer review? (Descriptive) b. What were students' perceptions of the learning benefits with the peer review process? (Descriptive) c. How did these processes influence their own writing? (Descriptive, Explanatory) d. What mental processes did students engage in while completing reviewing activities and constructing

feedback? (Descriptive)

Citation
Nicol, D., Thomson, A., & Breslin, C. (2014). Rethinking feedback practices in higher education: A peer review perspective. *Assessment & Evaluation in Higher Education, 39*(1), 102-122. doi:10.1080/02602938.2013.795518

Humanities Scenario
Instructors at a small undergraduate university introduce Google Books Archive as a key primary source during a research paper assignment for a fourth-year English literature course focusing on Victorian novels in order to increase depth of reading, interpretation, and analysis.

Research Questions
No questions listed: focus is whether students cited primary sources from Google Books Archive and used them to support their interpretation and arguments.

a. Does primary source research help students develop a deeper analysis when interpreting literary texts? (Explanatory)
b. What are student perceptions of how primary source research benefits their interpretation of literacy texts? (Descriptive, Explanatory)
c. What methods do students use to locate primary source materials? (Descriptive)

Citation
Karpenko, L., & Dietz, L. (2013). The 21st century digital student: Google books as a tool in promoting undergraduate research in the humanities. Journal of Effective Teaching, 13(1), 89-106.

Social Sciences Scenario
Researchers want to study how peer review activities during scaffolded writing assignments impacts student learning

Research Questions
d. How do students in the peer review sections compare to those in the non-peer review sections on final grades? (Descriptive, Explanatory)
e. How do students in the peer review sections compare to those in the non-peer review sections in terms of performance on individual assignments? (Descriptive, Explanatory)
f. How do students in the peer review sections compare to those in the non-peer review sections on drafts and final assignments? (Descriptive, Explanatory)

Citation
Crowe, J. A., Silva, T., & Ceresola, R. (2015). The effect of peer review on student learning outcomes in a research methods course. *Teaching Sociology, 43*(3), 201-213.

Research the Literature

A review of the educational research literature will alert you to existing research in the area, the theoretical frameworks and learning theories used to frame similar research questions, and the research approach and methods used to explore the topic and gather evidence to address the research question. It will also:

- Provide a context and justification for your research
- Ensure that the research hasn't been done before or that it is not just a "replication study"
- Highlight flaws in previous research and suggest areas where new research is needed

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Here are several information-gathering pathways to explore the educational research literature.

a. Browsing Issues on Teaching and Learning

Teaching Professor

Queen's has a subscription. Published 10 times per year by Magna Publications. Provides educational strategies and tactics for faculty and teaching staff in colleges and universities. "The newsletter offers a combination of concise information and inspiration to help faculty members teach more effectively." Topics

commonly addressed include: facilitating lively class discussion, overcoming student apathy, working with graduate assistants, testing and grading techniques, and working in groups.

Faculty Focus, published by Magna and edited by Maryellen Weimer. Register to receive this free newsletter and selected reports.

Examples of newsletter items (after free registration) include:

- Supporting learning outcomes: F2F and online
- Free clickers for all: Using Google Forms to survey your students
- Flipping feedback: Screencasting feedback on student essays

- An objective approach to grading
- Calculating final course grades: What about dropping scores or offering a replacement?
- Getting horses to drink: Three ways of promoting student ownership of reading assignments

b. Education terminology and concept definitions

If you want to check concepts or terms encountered along your research path, you might try the International Encyclopedia of Education, a scholarly source for short downloadable PDF files of well-informed and well-researched summaries of the key concepts in education. Cite these in your writing to define terms and describe conceptual frameworks. These academic entrees will provide the context you need to interpret scholarly research articles. Reading a scholarly overview of new concepts will ultimately build and strengthen your understanding of any subject area.

c. Google Scholar

GS searches a subset of scholarly materials including academic peer-reviewed journal articles, books, chapter, conference proceedings, research and technical reports, and dissertations and theses. GS claims to "... rank documents the way researchers do, weighing the full text of each document, where it was published, who it was written by, as well as how often and how recently it has been cited in other scholarly literature." (About Google Scholar)

How can I get Queen's holdings to appear in Google Scholar?

Links to the full text of all Queen's Library holdings will be listed with a Get it @ Queen's link if you follow these steps:

- Open Google Scholar
- Click Settings, then Library links.
- Type queen's (include apostrophe).
- Check the two options for Queen's in Kingston
- Save.

Consult the following tips box to focus your search.

Google Scholar Search Tips	
Search Technique	**Examples**
quotation marks for phrases	"student engagement"
OR in capitals for synonyms	post-secondary OR "higher education" OR university
intitle:limits next word or phrase to title (no space after colon)	intitle:"active learning" assessment physics
limit by date using timeline	since 2012
Cited by and related articles	Paste the title into GS as a phrase, and click "Cited by" to see who else has cited the paper.
Create alert	Use "Create alert" to run weekly GS searches automatically once you have identified a useful search string. Results are sent to your email.

d. Education and discipline-specific databases

Queen's offers many Education Databases. Recommended databases to begin your search:

Education Source: Encompasses an international array of English-language periodicals, monographs, and yearbooks covering all levels of education--from early childhood to higher education--as well as all educational specialties, such as multilingual education, health education and testing.

Education Source search showing key concepts with synonyms

concept 1: student engagement or active learning

concept 2: large class or class size

concept 3: subject area

concept 4: university or higher or post-secondary

ERIC: Education Resources Information Center: Largest education database in the world. Sponsored by the U.S. Department of Education. Two separate indexes: Current Index to Journals in Education (900 journals) and Resources in Education (.5 million teaching docs) which consists of grey literature such as institution and organization reports and curriculum.

Canadian Education: Indexes over 260 education-related journals and newsletters, with abstracts and article full text for a selection of these publications. The Canadian content in the database makes this the database of choice for periodical information on Canadian education issues

Academic Search Complete: A multi-disciplinary index (with abstracts) to more than 10,900 publications including peer-reviewed journals, conference proceedings, monographs and reports.

PubMEd: Also known as MEDLINE
Over 26 million citations for biomedical articles back to 1946. Also includes links to sites providing full text articles and related resources.

e. Other Search Tactics

- Scan the conference pages Society for Teaching & Learning in Higher Education
- Search within journals specializing in teaching in specific disciplines
- Use education handbooks for an overview of research in specific areas (e.g. online - Handbook of research on science education)

In reviewing journal articles, consider the following questions:

- What teaching and learning issue does the study address?
- Does it describe educational theories as a framework to understand the research?
- Does it summarize previous relevant research in the field?
- Are the research methods appropriate? What other approaches might have been used?
- Are the authors' interpretations and conclusions plausible? Consider:

  Validity: To what extent is the study a close representation of the truth?

  Reliability: Are the results credible and repeatable?

  Qualitative research often uses triangulation, the comparison of multiple sources of information and the use of more than one method of data collection in the same research, to increase reliability of findings. Quantitative research uses strategies such as Inter-Rater or Inter-Observer Reliability or Test-Retest Reliability to ensure reliability.

  Applicability: Will the results help others in their practice/research?

- What research questions are suggested for further investigation?

- How does the article contribute to your learning?

It's useful to identify a tool for organizing and managing the citations you discover during the literature review process. The CTL is currently using Zotero to store, organize, and share citations and articles among members. For more information, please refer to the Zotero library guide. Other popular citation managers include Endnote and Mendeley.

Design Your Research Approach

The goal of research design is to select collection and analysis methods that will provide the evidence needed to address particular research questions. Research design is the "blueprint" of a research study, as it refers to the overall strategy that integrates all components of the study in a coherent, logical way. In any research design there should be a direct relationship between your research questions, the purpose of the study, and the decisions you make regarding data collection and analysis. There are many approaches to educational research and these will be influenced by your discipline and your interests. For example, Potter, M. K., & Wuetherick, B. (2015). Who is represented in the teaching commons? SoTL through the lenses of the arts and humanities. The Canadian *Journal for the Scholarship of Teaching and Learning, 6*(2), 1-18. doi:10.5206/cjsotl-rcacea.2015.2.2, describes the value brought to SoTL in arts and humanities research.

What type of evidence would you need to answer the question?

- What types of data would be the most meaningful and valid to help you answer your questions? Different types of data (written, oral, and visual work; formative and summative assessments; qualitative and quantitative data; institutional data and documents) can address different questions:
- What is your methodological approach - qualitative, quantitative, mixed methods, or critical/theoretical?
- What is your timeline for data collection? This will impact the type of evidence you collect.
- What is the availability of resources for your study, whether it is the budget, existing information, human resources, or a participant pool?
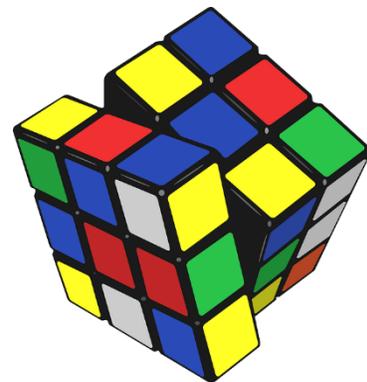

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You can collect both direct and indirect evidence. Direct evidence answers the question "What have students learned?" and can include:

- Samples of student work (essays, exams, in-class writing, one-minute papers, lab reports, portfolios, assignments)
- Assessment data from quizzes (paper, online, or response systems)
- Evidence of thinking from research journals, concept maps, think-alouds, reflections
- Analysis of online discussions, number of posts
- Observations of student interactions or presentations in the classroom (can be videotaped)

Indirect evidence answers the question, "What do students report they've learned?" and can include:

- Responses to survey or interview questions (regarding content, satisfaction, learning preferences)
- Focus groups
- Teaching reflections
- Course grades

What form of data collection would you use?

- What are the potential strengths and weaknesses on your data collection method?
- What type of assistance might you need when undertaking data collection? (recording, software)
- How will you ensure that your collection methods are valid and reliable?
- Will you need to pretest your data collection instrument? If so, how?
- How is the data collection and analysis aligned with the theoretical framework?

What theoretical framework can guide you?

A theoretical framework is simply an explicit acknowledgement of the theories and literature that inform your orientation to the issues under study. This framework differs from the conceptual framework for your research which is the research paradigm of how you will explore your research questions. Adopting a theoretical framework from the outset of your work can guide your research from the early stages of identifying your research questions to interpreting and making sense of your data. The framework offers a lens, blueprint, or perspective through which to understand your work and can consist of a theory or group of theories or a series of related concepts. This framework must be constructed by you based on the ideas that are relevant to your study. It will guide you in the formulation of your questions, the scope of your research data, your choice of research methods, and your interpretation of results and how they relate to past research. Your research might relate to learning theories that concern cognitive development, student engagement, experiential learning, multimedia learning, motivation, transfer of learning, social constructivism, situated cognition, cooperative learning, metacognition and self-regulation, communities of practice, or problem-based learning theory. Examples of broader theories include critical race theory, feminist theory, self-efficacy theory, information processing theory, and community of inquiry.

For definitions of learning theories online, check:

- *International encyclopedia of the social and behavioral sciences* (Queen's has an online subscription)

- *International encyclopedia of education* (Queen's has an online subscription)
- *SAGE research methods* (Queen's has an online subscription)
- [LearningTheories.com](#)

For more comprehensive descriptions, request the many print books on learning theories from the Education Library, such as *The handbook of educational theories* (LB14.7 H3636 2013)

Qualitative Research Methods

Evidence of student learning can be collected in quantitative or qualitative form or both. Quantitative data (e.g. survey, questionnaire, quasi-experiment, content analysis, test scores) provides numerical data that is analyzed using descriptive and inferential statistics. Qualitative data (e.g. interview, open-ended survey questions, focus groups, observation, and content analysis) can provide textual, verbal, or visual data that is analyzed by coding for themes or patterns and then classified. It can also be analyzed quantitatively using content analysis to count the frequency of a theme or pattern. Appropriate methods and their selection are dictated by the research questions.

Interviews

Interviews allow for a friendly and mutual exploration of topics. Conversations provide immediate responses, opportunities for detailed questions, and clarification using probing questions. Participants are often much more willing to provide more thorough and more meaningful information about how they feel about a topic when in conversation. While talking is much quicker than writing, interviews can be challenging for researchers, as transcription is expensive and time-consuming. Interviews require skill in developing good questions and performing the interview and pre-testing questions is always recommended. Because interviews must be interpreted, bias may easily be introduced, and the validity of results may be questioned. While it is difficult to make direct comparisons or generalizations based on interview data, they enable deep understanding of an issue and probe complexities that cannot be fully explored with quantitative data. Data consist of verbatim quotes which can be thematically coded and classified but must always be kept in context.

Types of interviews:

- Unstructured: In-depth or intensive interviews where the exact wording, the order, and the answers have not been pre-determined. Often an interview guide is prepared as a starting point, however the research issue(s) is explored through an interactive conversation.
- Semi-structured interview: In-depth or intensive interviews where an outline of the questions is pre-determined, however, researchers have flexibility during the interview to probe into questions further or follow-up on ideas presented during the conversation.
- Standardized open-ended (structured): All participants asked the same questions in the same order. Interviews are more formal in standardized format because flexibility is lost. However, this type of interview may reduce the possibility of bias and allow for more generalizable results. They are useful when looking for very specific information, as opposed to impressions, perceptions and feelings.

Focus Groups

Focus groups involve bringing a group of individuals together to explore a given theme and lead a guided discussion on the topic. The focus group format allows researchers to collect data from a far greater number of subjects than one-on-one interviews will allow. Focus groups also provide the opportunity to explore group dynamics, possibly bringing out issues that would not have emerged in a one-on-one interview setting. During focus groups, discussions can easily get off-track. These discussions often generate large amounts of data that may be difficult to analyze. In group settings, some may be less inclined to be open and honest.

Case Study

Case study research involves exploring a single program, event, activity, process, or classroom in depth. Detailed information from a variety of data sources is collected over a sustained period of time. Although results cannot be generalized to other situations, case studies in educational research provide a singular model of a classroom in action with its own unique teaching and learning participants, environment, influences, and constraints

Observation

Observation involves fieldwork where activities, behaviours, actions, conversations, interpersonal interactions, organizational or community processes, or any other aspect of observable human experience is described. Data consist of rich, detailed descriptions, including the context within which the observations were made. Participant observation involves the researcher becoming part of the group being studied in order to better understand the subjects in question and observe their behaviour. Immersion into the group may be either overt or covert. Observation allows for research to take place in a natural setting. It is generally unstructured and used for exploratory purposes. The researcher must become familiar with a particular group of subjects by immersing themselves in the world of their subjects in order to understand their behaviour.

Observation can cause participants to change behaviour if they know they are being observed and there are ethical considerations around some forms of observation. Because observation is time- and resource-consuming and generates large amounts of data that may be difficult to analyze, the number of subjects studied is usually small. The data is rarely generalizable and the ability for the researcher to be subjective must be considered.

Observation can also be done using a pre-developed instrument or form, where the researcher captures specific events and activities. Structured observation usually entails watching and listening in a natural setting without interaction and aims to be as unobtrusive as possible in order to capture the most accurate understanding of natural behaviour. This requires very clear rules and descriptions in order to ensure consistency of data capture and coding throughout the study. The method can be very time consuming in order to get a representation of the activities.

Qualitative Content Analysis

Content analysis involves studying texts (broadly defined), documents and/or communications produced by a given group or institution. This includes written materials and other documents from organizational, clinical, or program records; memoranda and correspondence; official publications and reports; personal diaries, letters, artistic works, photographs, and memorabilia; written responses to open-ended surveys; and assignments or research logs. Data consist of excerpts from documents captured in a way that records and preserves context. Document analysis requires the researcher to code and classify sources using pre-identified categories and/or developing codes and categories as the data is being analyzed.

Content analysis examines materials that have already been produced and may be readily available such as assignments and research logs. Content analysis is less obtrusive than other qualitative methods because it does not involve researcher interaction with the subjects. However, the researcher has to interpret the data without the benefit of contact with those who produced it. Deciding what is relevant and coding can be time-consuming work, however, new software packages such as NVivo and ATLAS.ti can be helpful.

Survey Research

Survey research collects data in a pre-determined format from all or part of a population to assess the relative incidence, distribution, and interrelations of naturally occurring variables. Questions can be open-ended or closed resulting in a combination of both qualitative and quantitative data. The method provides participants with a high level of confidentiality and anonymity which can solicit more honest responses; however, the high level of anonymity makes it difficult to ensure a representative sample. Surveys can be replicated by other researchers as well as over time in order to generate longitudinal data. They cannot capture complexity of individual answers or human experience and do not easily allow for follow-up and clarification.

Quantitative Research Methods

Survey Research

Survey research collects data in a pre-determined format from all or part of a population to assess the relative incidence, distribution, and interrelations of naturally occurring variables. Questions can be open-ended or closed resulting in a combination of both qualitative and quantitative data. The method provides participants with a high level of confidentiality and anonymity which can solicit more honest responses; however, the high level of anonymity makes it difficult to ensure a representative sample. Surveys can be replicated by other researchers as well as over time in order to generate longitudinal data. They cannot capture complexity of individual answers or human experience and do not easily allow for follow-up and clarification.

Integrative Research Synthesis

An integrative research review synthesizes the accumulated state of knowledge on similar or related topics, highlighting important issues and trends in that body of scholarship. The research brings together and assesses literature to describe how particular issues are conceptualized within the literature, how research

methods and theories have shaped the outcomes, as well as strengths and weaknesses of the literature. In short, it evaluates material that has already been published.

Experimental research

Experimental research design measures cause and effect where at least one independent variable is manipulated, other relevant materials are controlled, and the effect on one or more dependent variables are observed. While it is generally considered to be the most rigorous research design, it is also criticized for its artificial and often contrived nature. The artificial quality of the design makes it very difficult to create situations that are reflective of real life. In academic settings, experimental design can be difficult because the design often requires withholding or altering service or instruction in control or treatment groups, which can raise ethical issues.

There are multiple types of research design associated with experimental research including:

- True Experimental Designs: Pretest-Post-test Control Group Design

- Quasi-experimental Design: Pretest-Post-test Non-equivalent Control Group Design (participants are not randomly assigned to groups)

Quantitative Content Analysis

This method involves the classification, tabulation, and evaluation of key themes in a body of material to ascertain its meaning and probable effect. The analysis involves counts of the number of times that certain concepts, ideas, or attributes appear in a particular set of textual documents. It is an inexpensive and unobtrusive method but can be time consuming. Data analysis software, such as NVivo, can assist with the process. This method is sometimes combined with interviews or focus groups to unravel the researcher's interpretation of the content.

Mixed Methods Research

Mixed methods refers to the substantial, integrated, and systematic use of both qualitative and quantitative methods in order to provide complete answers to specific research questions. It is defined as:

> *... research in which the investigator collects and analyzes data, integrates the finds, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of inquiry.*

> *(*Tashakkori, A., & Creswell, J. W. (2007). The new era of mixed methods. *Journal of Mixed Methods Research, 1*(1), 3-7. doi:10.1177/2345678906293042. (p. 4))

Health and social sciences researchers can benefit from using this approach to address complex and multi-faceted research problems. In studies where people are involved, research questions can lead to the collection of multiple types of evidence to best address the purpose of the study:

Qualitative	Quantitative
individual stories (narratives/text from interviews) group interactions (focus groups)	frequencies (numbers relating to people, behaviours, trends gathered from surveys and questionnaires)

comparison of perspectives (analysis of multiple narratives)	frequencies over time (graph)
ideas over time (document and artifact analysis)	tests of probability
theory construction (built on themes derived across narratives)	statistical analysis

The use of surveys with both open- and closed-ended questions yields both qualitative and quantitative data but this does not qualify as a true mixed methods approach. The integration of methods needs to go beyond a superficial level and combine the two paradigms in meaningful ways. Mixed methods research has the following key features:

- Qualitative and quantitative data collected in response to the study questions
- Data collection and analysis follows rigorous procedures
- Use of a specific mixed methods design that involves a concurrent or sequential integration (and equal or unequal emphases)
- Integration of both data types through merging, connecting, or embedding the data so it is viewed as a cohesive and holistic whole
- Potential mix of multiple research paradigms (e.g., Constructivist (participant meanings derived from interviews, focus groups); Post-positivist (empirical measurement derived from survey data))

Scenarios of mixed methods research and designs:

- A survey is completed and, following analysis of results, a focus group is used to follow up on quantitative results. Data from the survey and focus group are then merged and compared.
- A focus group is used to gather information for the construction of a survey with a random sample. Data from the survey and focus group are then merged and compared.
- During an experimental study, qualitative data is gathered from study participants before and after the experiment.

Parallel Mixed Methods Design

Qualitative data & results → Interpretation ← Quantitative data & results
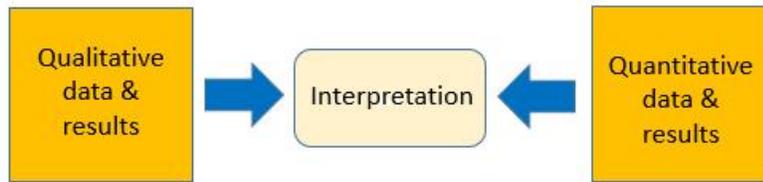
Embedded Mixed Methods Design

Quantitative pre-test data & results → Qualitative Intervention → Quantitative post-test data & results → Interpretation
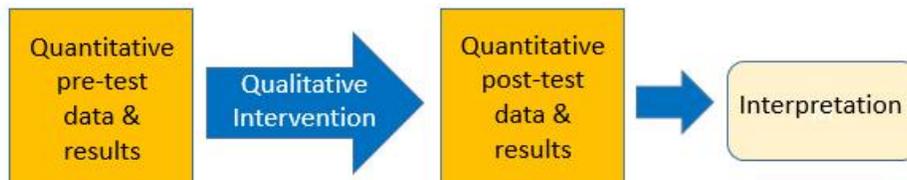
Critical-Theoretical Research Methods

Critical/theoretical research addresses questions of representation, interpretation, and meaning as opposed to concrete teaching and learning events in a classroom. A conceptual paper might analyze what it means for students to be "engaged", not just summarizing what has been said, but:

- Defining a problem around the notion of "engagement"
- Amalgamating conceptual frameworks to think about the problem
- Critically assessing the literature, including comparing different conclusions
- Critiquing research methods used and how these may have led to the different conclusions
- Constructing an evidence-based argument that critically assesses the idea of engagement

Critical-theoretical analysis draws on written text and or concepts rather than data gathered directly from human subjects. This kind of research is not designed around specific methodologies and focuses on how ideas are conceptualized. Critical-theoretical research is conducted by scholars in the arts, humanities, and social science, but it has not been as common in educational research studies.

Integrative Research Synthesis

An integrative research review synthesizes the accumulated state of knowledge on similar or related topics, highlighting important issues and trends in that body of scholarship. The research brings together and assesses literature to describe how particular issues are conceptualized within the literature, how research methods and theories have shaped the outcomes, as well as strengths and weaknesses of the literature. In short, it evaluates material that has already been published.

Critical Conceptual Review

A critical conceptual review describes how the particular issue is conceptualized within the profession and the literature. In particular, the review examines how a concept is enacted and represented in practice. The author provides a critical narrative review of the concept, highlighting important issues and trends in that body of scholarship.

Historical Review

A historical review is a survey of the development of a particular field of study and analyzes the scholarship in a historical perspective. Explanations of phenomena that relate to teaching and learning are framed within the historical context of university policy and
practice. Understanding the intellectual development of faculty as educators allows us to better situate our research in the context of an ongoing and evolving discussion.

State-of the-Art Review

The state of the art review examines the most recent contributions to a field or area of study such as trends, agreements, and debates. This is the kind of review that editors of journals write at periodic intervals in order to position their journal and its future directions.

Theory Application

The purpose of writing a theory application paper is to apply established theories to contemporary problems and issues in teaching and learning. A theory application paper provides a clear description of the theory, reviews the related body of research, and then describes how the theory informs or explains a particular issue or phenomena.

Ethics Review Process

Queen's University has authorized the General Research Ethics Board (GREB) to review social sciences and humanities research involving human participants conducted under the auspices of the Tri-Council Policy Statement (TCPS2 – 2014). The Tri-Council of
Canada Policy Statement (TCPS 2) Ethical Conduct for Research Involving Humans (2014) is the official human research ethics policy of the 3 Agencies - CIHR, NSERC, and SSHRC.

Each university has support pages with downloadable templates and forms that are required for working with participants or where identification of individuals is possible.

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The statement is based on three core principles:

o   Respect for persons (informed consent)
o   Concern for welfare (physical, mental, and spiritual well-being)
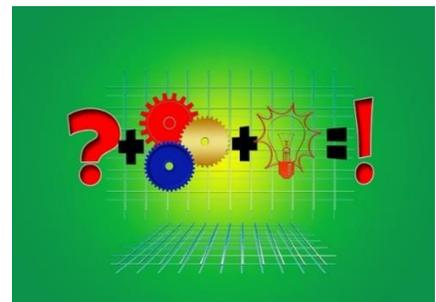o   Justice (equity and equality)

GREB reviews and oversees research to ensure that it meets ethical principles and complies with applicable regulations and guidelines pertaining to human participant protection, welfare, as well as current and emerging best practices. If you intend to publish research involving data involving students, you must complete the ethics review process. Faculty researchers are encouraged to complete CORE (Course on Research Ethics), a free, self-paced, online tutorial featuring interactive exercises, and multidisciplinary examples. Developed by the Interagency Advisory Panel on Research Ethics, CORE consists of 8 modules and is designed for researchers and REB members to assist with the interpretation and application of the TCPS2.

The tutorial does not have to be completed in one sitting as progress points are automatically saved allowing users to resume their session at another time. The length of time a person takes to complete the tutorial varies depending on how many examples and options they choose to explore but on average, completion takes three hours. While the tutorial includes quizzes, it is not a test or examination and there is no pass or fail assessment. CORE is mastery-based, providing a certificate of completion that can be printed.

What ethical considerations would you have to address?

- Does your study require an application to an ethical review board because it will involve human subjects or identifiable information from individuals?
- How do the three core ethics principles (respect for persons, concern for welfare, and justice) apply to your study?
- How will you protect sensitive information, including study participant confidentiality and intellectual property?
- How will you ensure that you have consent that is informed and voluntary?

Research Ethics Application Example
- Study description, significance, and methods plus references
- Letter of information
- Consent form
- Samples of recruitment scripts and data collection methods

Letter of Information
- Identities of researchers, institutions
- Study granted clearance by … and contact information
- Aims and procedures
- Description of risks

Informed Consent
- The purpose of the study
- The type(s) of data that will be collected
- The procedures used to collect data
- How data will be reported
- If and how confidentiality and anonymity will be provided to participants
- Participation is voluntary and participants can withdraw from study at any time

Gather Data & Complete Analysis

What form of data analysis would you use?

- What are the potential strengths and weaknesses of your data analysis method?
- What type of assistance might you need when undertaking data analysis? (transcription, software)
- How will you ensure that your analysis methods are valid and reliable?
- How is the data analysis aligned with the theoretical framework?

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How would the data be managed?

- What types of data will be produced in terms of format, file size, and classification (e.g. quantitative, qualitative, or sensitive)?
- What metadata standards do you need to follow for documentation?
- What policies do you need to follow with respect to data sharing and reuse?
- How will you ensure archiving and preservation of the data you produce?

Tools to Help You

Survey Software

FluidWare was recently purchased by SurveyMonkey. SurveyMonkey subsequently announced the discontinuation of the FluidSurveys (FS) product to which Queen's has subscribed over the past few years. As a result, Queen's has begun the process for assessing and ultimately acquiring a new enterprise survey software system.

Our current FluidSurveys license will remain in force and access to FluidSurveys will continue until September 30, 2017. In order to ensure a smooth transition to a new system (user training, account creation/transfer, platform transfer support to active surveys as of September 2017, etc.) we intend to complete the acquisition of a new system by June 1, 2017. Please see Queen's survey information for the latest information.

NViVo and ATLAS.ti

NViVo and ATLAS.ti are not supported by ITS on campus. They are examples of CAQDAS, Computer Assisted Qualitative Data Analysis tools. For this comparison of NVivo, ATLAS.ti and MAXQDA. NVivo is data analysis software designed to help researchers organize, manage, code, and analyze qualitative and mixed-methods research data. It can:

- Import, sort and analyze audio files, videos, digital photos, Word, PDF, rich text and plain text documents.
- Work with transcripts or work without them, analyzing material straight from audio and video files, or create transcripts or text files in the software as you go.

- Import and code documents, including those that contain tables and images.
- Work in virtually every language.
- Graphically display project information, connections and findings in real time using models and charts.
- Share files and findings, including audio, video or sections of documents with clients or colleagues who don't have NVivo, using HTML web pages.

See the NViVo [video tutorials](#).

ATLAS.ti is also used for organizing and coding qualitative research. It enables the researcher to work through the data, highlighting and grouping it with the addition of specific annotations. The data and comments are searchable and can be sorted and visualized in different forms to enable clarification of relationships. It can:

- Import multimedia files and PDFs
- Work in multiple languages
- Build visual models and mind mapping
- Export to SPSS, HTML, CSV

See the ATLAS.ti [video tutorials](#).

Queen's Data Management Plan Checklist

Developing a data management plan at the start of your study ensures that you will plan, collect, organize, manage, store, backup, preserve, and share your data. The key elements of the plan are to:
- Follow the guidelines set by your funding agency and institution.
- Comply with ethics and privacy policies for sharing data.
- Make your data accessible to others.
- Preserve your data for future use.

Please contact Queen's University Library's [Data Services](#), located on the Lower Level of Stauffer Library for assistance.

Research Data Life Cycle

The University of Queensland created this image as an aid to thinking about the cycle of research.

- Data management checklist
- Collect data
- Organize and store data
- Preserve data for others
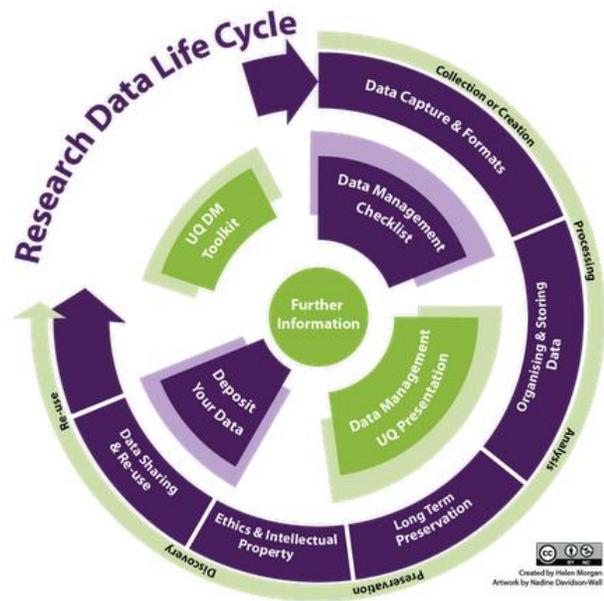
Evaluate & Reflect on Research

In reflecting on the effectiveness of your research project, there are several areas for review:

Was the direct or indirect evidence you collected able to make learning more visible?

1. Research Approach and Evidence

- Was your research design appropriate for the research question?
- Did your research data address your research questions?
- What other form of data might have been collected and why?
- Are your findings valid - meaning credible, trustworthy, and believable?

2. Awareness of Learning Processes

- What new learning processes have you been able to observe in the classroom that you cannot see during traditional exam completion?
- Why do you think these less observed processes might be important?
- How has the study changed your views on student learning?
- What other aspects of teaching and learning in this area might be investigated in future?

3. Teaching and Learning Impact

- What meaning and significance does the research have for your teaching practice?
- What changes will you make to your teaching practice as a result of your research?

- How will you know that student learning has changed or improved as a result of what you learned from your research?
  While you may not be able to achieve your results in the short term, you should have a plan in place to evaluate your project and report on your results

Communicate and Share Research

The dissemination of your findings, insights, and experiences helps all educators progress and evolve.

Conferences
- Canadian Society for the Study of Higher Education
- Conferences on education in specific disciplines e.g. Canadian Engineering Education Association
- International Evidence Based Library and Information Practice Conference
- Society of Teaching & Learning in Higher Education
- The International Society for the Scholarship of Teaching & Learning (ISSOTL) Annual Conference
- International Society for exploring teaching and learning

Journals on Teaching and Learning

Academic Exchange: "ideas, research, methods, and pedagogical theories leading to effective instruction and learning regardless of level or subject." Refereed.

Active Learning in Higher Education: "all aspects of developments, innovations and good practice in higher education teaching and learning worldwide". Refereed.

Assessment and Evaluation in Higher Education*:* publishes "pragmatic, research-based or reflective studies which help to illuminate the everyday practice of assessment and evaluation in higher education". Refereed.

Brock Education: A journal of educational research and practice: research and practice of teaching and learning at all levels." Refereed.

Canadian Journal of Higher Education: mostly empirical research studies on various aspects of Canadian higher education, including teaching and learning issues. Refereed.

Canadian Journal for the Scholarship of Teaching and Learning

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College Teaching: short articles on a wide range of teaching and learning issues and methods. Refereed.

Evidence-based library and information practice: "research and commentary on the topic of evidence based library and information practice." Refereed.

Harvard Educational Review: "mission is to contribute to the knowledge and greater understanding of educational issues that are of central importance in our society today." Refereed.

Higher Education: long-established international scholarly journal with an emphasis on empirical studies of teaching and learning in higher education. Refereed.

Higher Education Research and Development: scholarly international papers on teaching and learning in higher education, with a preference for empirical studies. Refereed.

Innovations in Education and Training International: short papers on innovations in higher education world-wide, with an emphasis on cases and methods relating to educational technology. Refereed.

Innovative Higher Education*:* an American journal that aims to present "fresh ideas in higher education in a straightforward and readable fashion". Refereed.

International journal for the scholarship of teaching and learning: "forum for information and research about the scholarship of teaching and learning (SoTL) and its implications for higher/tertiary education." Refereed.

Journal of Classroom Interaction: "empirical investigations and theoretical papers dealing with observation techniques, research on student and teacher behavior, and other issues relevant to the domain of classroom interaction." Refereed.

Journal of Effective Teaching: "insights in pedagogy, innovations in teaching and learning, and classroom experiences in the form of a scholarly communication". Refereed.

Journal on Excellence in College Teaching*:* papers on teaching and learning in higher education, including empirical studies, conceptual discussions, and case studies. Refereed.

Journal of Higher Education: the leading scholarly journal in the field of higher education, including teaching, learning and educational development issues. Refereed.

Journal of Student Centered Learning*:* publishes theory-based articles, case studies, and descriptions of applications of student-centred learning (e.g. collaborative learning, project-based learning, experiential learning, etc.)/ Refereed by editorial board.

Journal of the Scholarship of Teaching and Learning: "promotes SoTL investigations that are theory-based and supported by evidence." Refereed.

Journal of University Teaching and Learning Practice: "providing a broad –based disciplinary approach." Refereed.

National Teaching and Learning Forum: "college teaching and learning issues including learning theory, class management, pedagogical innovation, technology and more." Refereed.

New Directions for Teaching & Learning: "current and future directions in teaching and learning in postsecondary education, to illuminate the context that shapes these new directions, to illustrate these new

directions through examples from real settings, and to propose ways in which these new directions can be incorporated into still other settings ." Refereed.

Positive Pedagogy: accepts submissions, articles, and commentaries dealing with "innovative, successful and otherwise noteworthy practices in Canadian postsecondary education". Refereed.

Quality in Higher Education*: mainly empirical studies of evaluation and quality issues, including quality of teaching and learning. Refereed.

Review of Higher Education: wide range of issues in higher education, including historical, political, and sociological perspectives; some papers deal with teaching and learning issues. Refereed.

Studies in Higher Education*: leading British journal for a wide range of issues in higher education, but with a particular focus on teaching and learning; publishes empirical and conceptual papers as well as case studies. Refereed.

Teaching in Higher Education*: papers on teaching, learning, curriculum and educational development, including empirical and conceptual papers as well as case studies. Refereed.

Discipline-Specific Journals in Teaching and Learning

Nearly all the major disciplines and professions have one or more journals that focus on teaching, learning, educational development and curriculum issues in that discipline. There are too many journals to list here, but a list is provided on the [Association of College & Research Libraries](#) website:

Biology American Biology Teacher: applies both conceptual and practical approaches for use by science teachers. "Articles" section reviews recent discoveries, concepts and developments, as well as educational theories and trends in biology teaching. "How-To-Do-It" includes practical articles for classroom procedures, experiments, and demonstrations.

Journal of Biological Education: international journal with recent research in biological education and the practical and theoretical aspects of teaching the biological sciences.

Chemistry Biochemical Education: purpose is to "assist in the teaching of biochemistry to science and medical students throughout the world". Articles on teaching techniques and practice, methods of assessment, and classroom

Journal of Chemical Education (JCE) is a publication of the American Chemical Society. JCE aims "to provide chemistry teachers (middle school to graduate level) with information, ideas, and materials for improving and updating their background and their understanding of the science, and for helping them in their teaching and in their effectiveness in developing the talents of students. The central idea here is that this should be not only a 'living textbook of chemistry' as one of the early editors put it, but a perpetual and dependable learning source for chemists who teach.

Economics Journal of Economic Education is a quarterly publication that discusses innovations and evaluations in terms of teaching techniques, materials, and programs in economics. Articles cover content and pedagogy for introductory to graduate-level instructors. Manuscripts for submission should fall under one of the following categories: research in economic education; economic content; economic instruction; and online material for teaching and learning economics.

Journal of Teacher Education: purpose is to "stimulate discussion, study, and experimentation amongst educators". Themes presented in the journal are cognitive science and critical thinking, field experiences and teacher education, professional ethics, and restructuring teacher education.

Engineering Journal of Engineering Education: articles discuss the present and changing field of engineering education; its history and its current influence; recent and future trends; interdisciplinary and inter-institutional efforts for the development of engineering education; outreach beyond engineering education; and the improvement of technical literacy.

Journal of Geography in Higher Education is devoted to the teaching of geography in international institutions of higher education. It provides "a forum for geographers and others to discuss educational interests, present educational research results, and advocate ideas". Three issues of the journal are published per year in conjunction with University College, Northampton, UK.

Journal for Research in Mathematics Education focuses on the interests of mathematics teachers and education from pre-school through to adult education and includes: research reports - experiments, surveys, and case studies; philosophical studies; articles about research - literature reviews, theoretical analyses; critiques of articles and books; and brief commentaries on research articles.

Teaching Mathematics and Its Applications is published quarterly by the Institute of Mathematics. This journal is designed for the teaching of mathematics at the secondary and tertiary levels - specifically first year undergraduate courses. Articles demonstrate the applications of mathematics and improvements for its teaching.

Philosophy Teaching Philosophy: focuses on the relationship between philosophy and teaching, curricula, courses, methods, and problems faced by philosophy teachers. Ideas are exchanged regarding the practical and theoretical elements of teaching and learning philosophy.

Physics Education: designed for those involved with the teaching of physics in schools and first year undergraduate courses. Offers new ways of teaching and presenting experimental and theoretical aspects of physics. Teachers are provided with recent information on new developments, applications, curricula, courses, textbooks, software, and equipment in the field.

 The Physics Teacher is designed for those teaching introductory physics courses at any educational level. Articles discuss physics research, the history and philosophy of physics, applied physics, curriculum developments, pedagogy, lab equipment, and book reviews. The American Association of Physics Teachers publishes the journal nine times a year.

 Teaching of Psychology: topical articles on teaching-related issues; methods and techniques – learning and teaching activities; faculty forum – diverse issues in teaching with commentary, criticism, and opinion; and computers in teaching – use of classroom computers, innovative approaches, software reviews, and teaching techniques.

Science Journal of Chemical Education is a monthly publication and learning source for chemists who are teachers. Articles provide information, ideas, and materials specific to the understanding of chemistry, and offer ideas for both teaching and effective development of students' knowledge and skills. Articles are published in the following main areas: "Chemical Education Today", "Chemistry Every Day for Everyone", "In

the Classroom", "In the Laboratory", "Information, Textbooks, Media, Resources", and "Research: Science and Education."

Journal of College Science Teaching (JCST) is published by the National Science Teachers Association. The journal explores innovative techniques to improve interdisciplinary teaching methods. Strategies are included for the teaching of science and non-science majors, and articles are designed for instructors in a variety of disciplines. Objectives for the JCST: to teach about the nature of science and the relationship of science and society; to exchange instructional ideas and experiences; to discuss innovative media and other teaching materials; and to publish general interest articles for teachers of undergraduate courses.

Journal of Research in Science Teaching is the journal of the National Association for Research in Science Teaching. This monthly journal "publishes reports for science education researchers and practitioners on issues of science teaching and learning and science education policy." The science education articles discuss philosophy, historical perspectives, teaching strategies, and curriculum development.

Medical Education Journals

Academic Medicine (US) is the official, peer-reviewed journal of the Association of American Medical Colleges. It is an international forum for the exchange of ideas, information, and strategies to address the major challenges facing the academic medicine community. The journal's areas of focus include: education and training issues; health and science policy; institutional policy, management, and values; research practice; and clinical practice in academic settings.

Anatomical Sciences Education (US) provides an international forum for the exchange of ideas, opinions, innovations and research on topics related to education in the anatomical sciences of gross anatomy, embryology, histology, and neurosciences at all levels of anatomical sciences education including, undergraduate, graduate, post-graduate, allied health, medical, and dental.

BMC Medical Education (UK) is an open access journal publishing peer-reviewed research articles in relation to the training of healthcare professionals, including undergraduate, postgraduate, and continuing education. The journal has a special focus on curriculum development, evaluations of performance, assessment of training needs and evidence-based medicine.

Canadian Medical Education Journal (Calgary) is an open-access peer-reviewed journal exploring new developments and perspectives in the field of medical education from premedical to postgraduate and continuing medical education. It examines the quantitative and qualitative aspects of prominent issues relating to the education, training and maintenance of health care professionals. It provides a forum for discussion specific to the challenges faced by medical educators, especially in Canada but also internationally. The target audience includes medical education researchers, practitioners and professionals, universities and their trainees.

Clinical Teacher (UK) is the journal for clinicians who teach and people who are involved in education in a health care setting. It provides easy access to the latest research, practice and thinking in clinical education across the health professions. There are sections on specific teaching approaches, reports and evaluation of innovative learning activities, a digest of the latest research published in *Medical Education*.

International Journal of Medical Education (UK) is an international, peer reviewed, open-access journal

aimed at promoting the nature and scope of the knowledge that is directly relevant to all domains of medical education and practice.

Journal of Graduate Medical Education (US) promotes critical inquiry to inform and engage the graduate medical education community to improve the quality of graduate medical education. It is a peer-reviewed, editorially independent journal published by the Accreditation Council for Graduate Medical Education.

Medical Education (US) seeks to be the pre-eminent journal in the field of education for health care professionals, and publishes material of the highest quality, reflecting world-wide or provocative issues and perspectives. Publishes all aspects of health professional education including undergraduate education, post-graduate training, continuing professional development, and inter-professional education

Medical Teacher (UK) is the journal of the Association for Medical Education in Europe and addresses the needs of teachers and administrators throughout the world involved in training for the health professions. This includes courses at basic and post-basic levels as well as the increasingly important area of continuing education.

Simulation in Health Care (US) is a multidisciplinary publication encompassing all areas of applications and research in healthcare simulation technology. The journal is relevant to a broad range of clinical and biomedical specialties, and publishes original basic, clinical, and translational research.

Teaching and Learning in Medicine (US) is an international, forum for scholarship on teaching and learning in the health professions. Its international scope reflects the common challenge faced by all medical educators: fostering the development of capable, well-rounded, and continuous learners prepared to practice in a complex, high-stakes, and ever-changing clinical environment.

Magazines, Periodicals, and Newspapers

Chronicle of Higher Education: weekly newspaper *with* news about higher education in the USA and elsewhere: accepts contributed articles, including opinion pieces on teaching and learning issues; the Chronicle also has special sections on educational technology and distance education. Not refereed.

Change: bi-monthly periodical - "the magazine of higher learning" and publishes a wide range of articles on teaching, learning, educational development and curriculum issues, including descriptions of empirical research, case studies of teaching innovations, and discussions of organizational and policy issues. Not refereed.

Times Higher Education Supplement*: i*n addition to news about higher education in Britain and elsewhere, the paper accepts many contributed articles, including articles on teaching and learning issues. Not refereed.

National Teaching and Learning Forum, edited by James Rhem, and published Oryx Press, of Westport Connecticut (http://www.ntlf.com).

Teaching and Learning in Higher Education, published by STLHE (http://www.stlhe.ca/) has its own newsletter, which welcomes contributions from members. Newsletter submissions are generally not refereed.

Green Guide series of short (40-50 page) practical manuals for university and college faculty on important teaching and learning issues (http://www.tss.uoguelph.ca/stlhe/gguides.html). These are books written by one or two authors on a teaching approach or issue, such as *Teaching Large Classes* (Gedalof), *Active Learning* (Cameron) or *Teaching the Art of Inquiry* (Hudspith and Jenkins).

Journals on Educational Development

A number of the journals listed above include some papers on educational and faculty development, though that is not their main focus. In addition there are two international journals that are devoted to educational development issues.

International Journal for Academic Development: papers on any aspect of academic development in higher education, including empirical and conceptual papers as well as case studies. Refereed.

Journal of Faculty Development: short, mostly practical articles on educational development. Refereed.

Journal of Graduate Teaching Assistant Development: short, mostly practical articles on educational development for teaching assistants. Not refereed.