

Learning Sciences PhD Program Student Handbook



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1. Introduction

This handbook has been created to give students information regarding the policies, expectations, and conventions of the Learning Sciences Program. It is designed to supplement and clarify information provided on [The Graduate School website](#). Every student is responsible for reviewing the general policies for the PhD degree on [The Graduate School website](#) and the specific policies of the Learning Sciences PhD Program in this handbook.

Every effort has been made to make this handbook as complete, clear, and accurate as possible. If you have any questions about the contents of this handbook or [The Graduate School website](#), you should address them to the Program Coordinator your [Graduate School Student Representative](#).

Program Contacts

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Courses

Courses are an important part of the education of a PhD student. Students are expected to take courses during the first three years of their graduate career. Every student is required to take courses that fulfill specific requirements for breadth and depth in the three strands of the Learning Sciences (cognition, sociocultural context, and design), and in research methods. Students are also expected to take coursework and continue reading beyond these specific requirements. In particular, students should take coursework that is directly relevant to their research.

1.1 Course Requirements

The following are the course requirements for LS PhD students. Substitutions may be made, and specific requirements may be waived by permission of the Program Coordinator and the student's advisor.

Foundations

LRN_SCI 403: Foundations of the Learning Sciences

Cognition

LRN_SCI 401: Knowledge Representation for the Learning Sciences

Sociocultural Context

LRN_SCI 402: Social Dimensions of Teaching and Learning

Design

LRN_SCI 425: Introduction to Design for the Learning Sciences

and TWO of the following:

LRN_SCI 426: Design of Technological Tools for Thinking and Learning

LRN_SCI 429: Design of Learning Environments

EECS 472: Designing and Constructing Models with Multi-Agent Languages

Other appropriate courses may be used to satisfy this requirement by approval of the student's advisor and the [Program Coordinator](#).

Methods

LRN_SCI 404: Methods & Epistemologies for the Study of Learning 1

LRN_SCI 405: Methods & Epistemologies for the Study of Learning 2

And THREE of the following:

- LRN_SCI 410: Quantitative Methods 1
- LRN_SCI 411: Quantitative Methods 2
- LRN_SCI 415: Field Methods (Qualitative Methods 1)
- LRN_SCI 416: Advanced Qualitative Methods (Qualitative Methods 2)

Special topics methods courses (400-level) in Learning Sciences may also be used to satisfy methods course requirements. These include:

- Interaction Analysis
- Discourse Analysis
- Computational Methods (e.g. Designing and Constructing Models with Multi-Agent Languages)
- Multimodal Learning Analytics
- Indigenous Research Methods

Students may take the quantitative courses PSYCH_450, PSYCH_451, and PSYCH_453, in that sequence as a substitute for LRN_SCI 410, LRN_SCI 411. Other quantitative stats sequences in other departments may satisfy the quantitative

requirement, but need to be cleared with the Program Coordinator.

Seminars

Four seminars are required across years 2 and 3. Any non-required LS course and any graduate-level course in other departments can be used to fulfill the seminar requirement.

1.2 Course Requirements (Students Entering fall 2004 to fall 2020)

The following are the course requirements for LS students entering in the fall of 2004 to fall 2020 or later. Note: Students have the option to follow the new requirements noted in section 2.1. Substitutions may be made, and specific requirements may be waived by permission of the Program Coordinator and the student's advisor.

Foundations

LRN_SCI 403: Foundations of the Learning Sciences

Cognition

LRN_SCI 401: Knowledge Representation for the Learning Sciences

Sociocultural Context

LRN_SCI 402: Social Dimensions of Teaching and Learning

Design

LRN_SCI 425: Introduction to Design for the Learning Sciences

and TWO of the following:

LRN_SCI 426: Design of Technological Tools for Thinking and Learning

LRN_SCI 429: Design of Learning Environments

EECS 430: Design of Interactive Learning Environments

EECS 472: Designing and Constructing Models with Multi-Agent Languages

Other appropriate courses may be used to satisfy this requirement by approval of the student's advisor and the Program Coordinator.

Methods

Field Methods (Qualitative Methods 1) and Advanced Qualitative Methods (Qualitative Methods 2). These courses are now designated as LRN_SCI 415 and 416.

Quantitative Methods 1 and 2, in that sequence, as offered in SESP. These are now designated as LRN_SCI 410 and 411. Alternatively, students may take the quantitative courses PSYCH_450, PSYCH_451, and PSYCH_453, in that sequence. Other quantitative stats sequences in other departments may satisfy the quantitative requirement but need to be cleared with the Program Coordinator.

Seminars and other non-required courses

Five seminars are required across years 2 and 3. Any non-required LS course and any graduate-level course in other departments can be used to fulfill the seminar requirement.

1.3 Grading Policy

Grades are one of the ways that faculty provide feedback to students about the quality of their work and their progress toward a PhD. Therefore, it is important that students understand the standards of grading in the LS Program.

The Learning Sciences faculty has adopted the following scale for grading in graduate courses:

A Excellent

A- Very good

B+ Good

B Acceptable

B- Barely acceptable

C Poor

F Fail (no credit)

It is expected that PhD students will produce work at the B+ level or higher. Students who receive more than the occasional grade of B or lower should be aware that they are not performing at the level that the faculty expects of PhD students.

2. The First Year: Begin Research and Find an Advisor

Research is an essential element of the Learning Sciences doctoral program. The primary goal of the program is to prepare students to be independent researchers in the Learning Sciences. There are a variety of ways in which students learn to conduct research, including formal coursework in research methods. However, the most important way in which students learn to conduct research is through mentored participation in research. We often refer to this training as “research apprenticeship.” Thus, your life as a researcher is closely linked to your choice of an advisor.

Students are encouraged to begin to participate in research activities as early as possible in their graduate career. In the early stages, students may simply attend research meetings. Then, they may take responsibility for research activities under close supervision, gradually taking on more responsibility and more autonomy, until they are prepared to conduct independent research. Since students enter the Learning Sciences Program with very different levels of preparation for conducting research, there is no single path. Students should develop an individual plan for engaging in research in consultation with their advisor(s).

2.1 The First Year Advisor

Entering students are assigned, as determined by the Program Coordinator, a first year faculty advisor. This advisor may not be specifically investigating topics that a student is directly interested in – rather, the assigned advisor’s purpose is intended to assist in introducing the student to the broader LS community. The role of this first year advisor is to provide the student with general advice about classes, curricular decisions, research brainstorming, and other aspects of the LS and Northwestern community. The assignment of a first year advisor does not represent a commitment beyond the first year by either the student or the faculty member. Thus, this should not preclude students from looking for a more permanent advisor whose research interests him or her. Oftentimes, the student discusses with their first year advisor possibilities for who might serve as a permanent advisor. Again, the role of the first year advisor is merely to provide helpful advice to students as they begin their graduate career. (Note: Students enter the program with varied expectations as to whom they wish to work with. The assignment of the first year advisor is intended to help integrate students into the community and is not intended to obviate students’ preferences for who they might select as a more permanent advisor as early as they wish in their first year.)

2.2 Exploring Research Options

Students are required to begin participating in research in the winter quarter of their first year. To fulfill this requirement, students must minimally attend weekly meetings of one or more research groups or meet with a faculty member on a regular basis to discuss research. It is expected that the amount of research activities and the level of responsibility will increase steadily over time. This requirement applies regardless of whether a student is registered for an independent project during the quarter. A first year student who is not registered for an independent study may fulfill the research requirement simply by attending the meetings of a research group. **(But to be clear, a student’s goals should not solely be to attend meetings but rather to begin developing, implementing, and conducting research.)** A student who is registered for an independent study might engage in 10-15 hours of research activities including data collection or data analysis a week.

2.3 Selecting a Permanent Advisor

A PhD advisor plays a very important role in a graduate student's life and career. The PhD advisor supervises the student's research, provides guidance on academic and career issues, and serves as the chair of the student's dissertation committee. Because the advisor plays such a critical role, it is important to find the best possible match for both research interests and personality.

By the beginning of the summer following the first year, a student should select a permanent advisor. (In some cases, a student may be co-advised by two faculty members, or a student may continue to have more than one advisor into the second year.) The annual performance review form for the first year requires a student to identify an advisor and obtain the advisor's signature.

A faculty member becomes a student's advisor by mutual agreement. A faculty member is not obligated to advise any particular student nor to continue advising a student if the advisor is not satisfied with the quality of the student's work. Before selecting an advisor, a student should have a clear idea from the faculty member what he or she expects of the student, how the advisor expects the student to be funded, and how they will work together (e.g., how often they will meet and in what settings). In the case of students whose advisor will be supporting them with a research assistantship, the student and advisor should have a clear understanding of what the student will be expected to do for the research assistantship and the relationship between that work and their dissertation research.

It is not uncommon for students to switch advisors during their second year. There are many valid reasons for changing advisors, so students should be aware that they have the option to do so. However, changing an advisor is likely to slow a student's progress toward a degree and has practical implications. If a student has made commitments to complete work with or for an advisor, the student should make every reasonable attempt to fulfill that commitment as part of the plan for switching advisors. A student who is considering changing his or her advisor should consult with the Program Coordinator to develop a plan for making the change and to make sure the student understands the implications of the change. If the Program Coordinator is directly involved, the student should consult with the Dean or another tenured faculty member.

3. Intermediate Milestones

Step 1: Qualifying

- Guided Literature Review (GLR)
- Second year paper and research presentation
- Qualifying Exam form in GSP

Step 2: Prospectus

- The Graduate School and Learning Sciences [course requirements](#)
- Dissertation proposal and defense
- Prospectus Form in GSP

In the Learning Sciences program, there are two intermediate milestones. The first is called qualifying, which is ordinarily completed prior to the beginning of the third year. Qualifying is based on an evaluation of the students' work in the first two years, including coursework, the second year research presentation and paper, the written qualifying exam, and participation in research activities. At the completion of the qualifying process, students whose work meets the standards of the Learning Sciences faculty are invited to continue into the third year. Two important considerations in this evaluation are: (1) Has the student demonstrated the breadth and depth of understanding of Learning Sciences theory, methods, and empirical literature necessary to be a successful researcher in the Learning Sciences? (2) Has the student demonstrated the ability to conduct research of sufficient quality to complete a dissertation within a reasonable period of time with a reasonable level of faculty supervision?

The second intermediate milestone involves the completion of all coursework requirements, and the dissertation proposal. Ordinarily students complete these requirements during the third or fourth year.

3.1 Written Qualifying Exam: Guided Literature Review

Guided Literature Review

In addition to required coursework and the second year presentation and paper, students must also pass the Guided Literature Review to complete their qualifying exam requirement and advance to Ph.D. candidacy.

Guided Literature Review Summary

To pass the Guided Literature Review, the student must write a paper that demonstrates:

- a) A mastery of the literature across the Learning Sciences;
- b) The ability to synthesize and critique a literature
- c) The ability to craft an argument drawing on extant literature
- d) An ability to put multiple epistemological, theoretical, and/or methodological perspectives in conversation with one another.

The steps to completing the Guided Literature Review are:

1. **Select a topic** relevant to the Learning Sciences. Research topics should be narrow enough to synthesize a set of relevant literature in 30 pages, but broad enough to bring together different methodological and disciplinary perspectives. The initial statement of the topic is due to the LS coordinator on **November 1**. That statement should consist of a title along with a one paragraph description of the topic. Example topics are given below. The topic must be approved by the LS Coordinator, who

may consult with the larger faculty before making a final decision.

2. **Propose a review panel** of three LS faculty. One panel member should be the student's primary advisor. The other two panel members should be selected to provide breadth of expertise to the panel that spans the three strands. The proposed panel should be submitted to the LS Coordinator by **December 1**. The panel must be approved by the LS Coordinator, who may consult with the full faculty before making final decisions.
3. **Submit a proposed reference list** for panel approval by **the first day of winter quarter**. The reading list should address a broad range of literature and allow for a critical analysis of the topic. We anticipate the reading list will contain approximately 40 citations, although this figure may vary depending on the topic and the committee. Students will be provided a reading list with journal articles and book chapters that the LS faculty recommend for students to consider in their paper. The reading list is updated every year and serves as a resource for students and their panel of three readers. Students are not required to select a set number of readings from this list, but will work with their advisor and the panel to select papers from the list and beyond in their thematic areas. Each panel will have the independent responsibility of approving the proposed reference list of the paper.
4. **Write and submit the paper**. The essay should be approximately 25-30 pages long (excluding references), double-spaced, with 12 point font and one inch margins. It is permitted for students to seek help from faculty and peers. Here our model follows that of the second-year papers, proposals, and dissertations. In all those cases, it is understood that the product is primarily the work of the student author, even if substantial help and guidance is provided. As a check on the process, we also require that each student submit an approximately one-page statement describing the support and input they received. A polished draft of the paper is due **three weeks before the end of Spring quarter**. Students will receive feedback from their panel within one week of submitting this draft. Then, the final paper is due **one week following the end of Spring quarter exam week**. Additional guidelines for the writing of the paper are given below.
5. **The final paper is evaluated**. The panel then evaluates the final paper. (The one submitted one week following the end of Spring quarter.) If the paper is not passing as it stands, the panel members have two options. (1) They can ask for targeted revisions. (2) They can simply fail the paper, if they feel it cannot be amended within the two weeks allowed for revisions. The panel must return this evaluation **no later than two weeks following the deadline for the submission of the final paper**.
6. **Student responds to panel evaluation**. If the committee requests revisions, then these are due **two weeks following the request**. If the panel members deem that the paper is not passing, the student has the option to continue with the qualifying process, through the completion of the second-year paper and presentation. Following the presentation, the faculty will then make a decision with the student's full record in mind.
7. **Evaluation of the revised paper (if applicable)**. The panel must review and make a decision on the revised paper **no later than one week following its submission**. Again, if the panel members deem that the paper is not passing, the student has the option to continue with the qualifying process, through the completion of the

second-year paper and presentation. No further revisions are allowed.

Summary timeline

November 1	Topics due
December 1	Proposed Panel due
First day of Winter quarter	Proposed reference list due
Three weeks before end of Spring quarter	Polished draft due to panel
One week following end of Spring quarter	Final paper due
Three weeks following end of Spring quarter	Panel evaluation of final paper due
Five weeks following end of Spring quarter	Revised paper due (if applicable)
Six weeks following end of Spring quarter applicable).	Panel evaluation of revised paper due (if applicable).

Sample topics

Conceptual change in science learning. My paper will examine literature relevant to this question: What happens when student prior knowledge comes into contact with the science presented in the classroom? I will explore traditional cognitive views of conceptual change in science, including research from psychology and education research. A particular emphasis will be placed on how the differing cultural backgrounds of learners impacts the processes of conceptual change.

Methods of design-based research. My paper will examine potential methods by which design-based researchers iterate effectively while taking into account learner and stakeholder concerns. I will explore how different methods allow (or don't allow) learning scientists to iteratively develop socio-cultural, cognitive, and design models in order to develop new theories and practical products.

Gender and technology. University engineering departments play an important role in encouraging gender diversity in STEM fields such as computer science, and recent approaches have shown that departments can increase enrollment of women from single digits to near parity. This literature review analyzes work on gender equity in technology from a learning sciences lens, examining how social and cognitive factors promote and inhibit participation in technology disciplines.

STEAM learning in out-of-school contexts. Foundational and modern theories of learning sciences have proposed that education institutions should connect desired learning outcomes to learners' experiences outside school. Out-of-school contexts provide an exciting opportunity to develop learner's individual interests and connect them both to in-school learning and out-of-school experience. In this literature review I will survey recent approaches to STEAM learning in out-of-school contexts, paying particular attention to how these environments build on learners existing knowledge and social practices.

Collaborative learning for collective action. My paper will ask: How might we design online communities that allow peer groups to plan and implement solutions to collective action problems. Online collective action platforms raise interesting learning challenges because peers must both learn through the process of collaborative problem solving, group regulate processes and also model their peers' perspectives to choose a course of action that the group as a whole will support. This review will draw widely from socio-cultural models of participatory decision making, cognitive theories of socially-shared regulation of learning, design of online learning communities, and organizational theories of collective action.

Making sense of extended historical texts. Understanding historical texts requires integrating information from multiple historical sources and judging credibility of each source, a task perhaps complicated by the rise of the internet and the rise in popularity in the genre of historical fiction amongst millennials. This literature review will ask what cognitive and sociocultural influence learners' ability to make sense of historical texts, and how design of tests creates challenges and opportunities for educators teaching historical interpretation.

Diffusing educational improvements in a networked improvement community. This literature review will examine recent approaches to diffusing educational innovations, focusing on networked improve communities (NICs). The review will include a brief history of diffusion research in education followed by a more in depth examination of how NICs tackle cognitive, socio-cultural, and organizational factors to implementing new pedagogical approaches, ending with implications for design.

The Reading List

The reading list is updated annually by the faculty. Please see the Program Coordinator for a current copy of the suggested reading.

*The following criteria were generated and edited collectively by LS faculty in Fall 2024.

Qualities of a strong GLR:

- The scope and focus of the literature review are clearly articulated early in the paper. Students should work with their GLR committee to hone the scope and number of references. The scope and reference list should be narrow enough to reasonably accomplish the criteria below in 25-30 pages (excluding references, see [LS handbook](#) for details).
- The GLR focuses on a guiding question (e.g. what do we know as a field about x and what do we not yet know or need to better understand? Or: how has the field conceptualized the study of x? What are the contributions and limits of these theoretical and methodological approaches?) It can be useful to think of this as a research question for the literature. Such a focus is distinct from a broad survey that isn't organized around a guiding question. The guiding question is also likely to emerge and evolve as you engage with the literature.
- Though not a systematic review, the GLR should discuss the methods used in some way, walking the reader through the process developed to synthesize the literature. How were criteria for including or excluding various studies identified and applied? After the selection process, how did you work to think across the selected literature?
- The GLR should demonstrate substantial, critical, and engaged reading with the extant literature around your focal topic in conversation with the relevant [foundational literature](#) in the learning sciences. The GLR should also engage with key heterogeneities and debates within the field around the topic area. This includes demonstrating knowledge and serious consideration of alternate perspectives (e.g. What are the different perspectives on the issue? Where is there consensus? What are the important areas of disagreement and key open questions?)
- The central empirical findings related to the topic area within the field should be synthesized. In addition, a strong GLR critically appraises the connection between research question(s), methodological approach, and claims in the literature reviewed, and considers if and how the claims are merited given the methodological approach. This can be helpful for building an argument about the literature synthesized. The argument should take a stance on (1) the state of knowledge on the research topic, (2) what questions have not been answered, and (3) how we might be able to credibly answer them. This argument should not be made only at the end of the paper but rather be built throughout the review of the literature in the way the literature is organized, critiqued, and discussed.
- Next edges and possibilities for research in the focal area should be discussed. (e.g., What does the field need to know to further our understanding of X? Or: What methodological approaches or tools would add to the field's understanding of X and how? Or: What open questions remain for the

field related to X, and why are these important for the field to explore?)

3.2 Second Year Research Presentation and Paper

As part of the qualifying process, students are required to conduct a research project that they write up and present publicly.

As part of this research, a student must formulate a question or hypothesis and pursue it using an appropriate research methodology. The paper and presentation should ground the research in the existing literature, describe and justify the research design, present the findings, and describe limitations and next steps. In the presentation and the paper, students will be evaluated on the quality of the research and on the clarity, coherence, and organization of their communication.

The presentation is a 20-minute presentation to the Learning Sciences community modeled on a conference presentation. The model for the paper is a journal submission.

It should be written in accordance with APA guidelines and no more than 30 double-spaced pages in length (excluding references). As many faculty as are able will attend the presentations and participate in their evaluation.

The paper is due and the presentation takes place in the fall after the summer of the second year. The paper due date and presentation schedule will be announced at the beginning of the summer quarter. Two faculty members, including the student's primary advisor, will evaluate each paper. The faculty readers will be selected by the Program Coordinator in consultation with the advisor and student. Upon completion of the research presentation and paper the student should complete the qualifying exam form in GSP:
<https://www.northwestern.edu/ses/staff/gsp.html>

Additional guidance on the Second Year Paper process & genres of papers developed by LE faculty in Spring 2025:

Second year papers:

- The second-year papers may take several forms or genres, which we explain in greater detail below. Keep in mind that these are not mutually exclusive and can and often will overlap in some ways.
 - Empirical study of teaching and learning
 - Design research paper
 - Methodological innovation

*The student support committee will share more about criteria for each of these genres in Spring quarter 2027

Second year paper and presentation timeline and requirements:

- The second year presentations will take place at the end of the Fall quarter of students' 3rd year (likely early December) and will be announced by the beginning of the Summer quarter of the 2nd year.

- In order to present, students **must submit a completed second year paper to their advisor and second reader 4 weeks in advance of this presentation** (around week 6 of the Fall quarter, precise due date to be determined based on the scheduled presentation date). Advisors will provide feedback and work with students at this stage to prepare for presenting. Papers will need to be approved by the advisor (in consultation with 2nd reader) 2 weeks in advance of the student presentations in order for the student to present.
- Once you are approved to present, we strongly recommend practicing the talk several times to get feedback and refine before the presentation. The crafting of the slides and talk often presents an opportunity to sharpen the central narrative/argument of the paper in ways that can support ongoing paper revisions.
- We strongly encourage all students to plan on this timeline. However, we recognize that sometimes people will not be able to make this deadline. If you miss the deadline (meaning you do not submit a full paper 4 weeks in advance or your advisor/second year reader decide it is not yet ready to present), you can make a request for a 1 quarter extension that would go to the LS faculty to approve, with a discussion of the supports needed to finish this milestone by the end of Winter quarter. If that request is approved, you will be able to present in the Winter quarter. If you miss this extended deadline, there will be a conversation between you, your advisor and the LS coordinator about your future in the program.

Following the presentations:

- Advisors will communicate with students whether the paper and presentation have passed (pass, conditional pass, no pass) in the week following the presentations. A no pass decision would mean presenting and submitting again in the Winter quarter.
- This decision will be accompanied with feedback on your paper and presentation from the committee and the broader faculty. Students can expect that this feedback will include suggestions for revision to strengthen or clarify your representation of the literature, research design and process, findings, or discussion of implications, next steps, and limitations. Like the paper itself, this process is modeled on journal submission processes for revising and resubmitting. Attend to your committee's feedback, make suggested revisions to the paper, and share with the committee by the end of January or in a timeline agreed upon with your advisor following the presentation. In order to pass this milestone, revisions must be completed and approved by your advisor. This process of revision is an expectation for everyone given the value of revising your writing based on the feedback you receive on the paper and presentation.

Second Year Paper Genres

Second year papers, which report on the second-year project, may fall into one of three genres: (1) empirical paper, (2) design research paper, or (3) methodological innovation. All second-year projects will have empirical data, and many will have implications for design and methods. The paper, however, can foreground one of these contributions, and the guidelines below are offered to support second year students in deciding how best to focus the paper.

Empirical Paper

An empirical paper explores and answers research question(s) related to teaching and learning and related topics using a data set. Data can take numerous forms including interviews, observations, survey results, test results, documents (e.g., state policies, student work, photos of students in their neighborhood), and audio-video recordings of learning environments and interactions. Broadly, empirical papers use evidence to make and support empirical claims, drawing on, building, or testing theory and answering specific empirical questions. We encourage students to ask their advisors to recommend a few 'exemplary

papers in this genre.

Strong papers and presentations in this genre would attend to each of the following:

- Clear research question(s) motivated by *and* framed by the relevant literature (e.g., what gap, omission, edge, or puzzle in the literature are you addressing in this paper). A review of prior research focused on the specific questions at hand (not a comprehensive review) will be important so you can provide:
- A clear theoretical/empirical motivation for the work (Why these research questions? How are they important?)
- A clear definition and discussion of key constructs that focus your data collection and data analysis and how these constructs are operationalized in the paper (often in a theory or theoretical framework section)
- A detailed description and justification of the methodological design and approach, with careful attention to site and participant sampling, data collection methods, and approach to data analysis. Strong papers include:
 - Description and justification for sampling of research sites and participants tied to the stated research question.
 - Description and justification of data collection approach (e.g., why did you use interviews to gather data, how did you go about it).
 - Detailed description and explanation of coding and analytic schemes and how you moved from coded data to the development of finding(s).
 - Authentic discussion of limitations of the research design.
 - Discussion of any ethical decisions or considerations in the study design, as appropriate.
- A clear statement of one or two main findings or claims with concise explanation of how they contribute to the extant literature. Presentation of findings should:
 - Answer your research questions by using data as evidence to argue in support of the claims you are making and convince your reader that the claims are warranted. Write to interpret your data for the reader.
 - Organize your findings so they build on one another; considering how best to sequence the claims in the findings section.
 - Attend carefully to any disconfirming evidence and discuss what this means for your claim.
- A discussion and conclusion section should include:
 - Brief summary of the findings tied to the research question(s)
 - Discussion of the study's contribution to the literature detailed in the framing.
 - Discussion of findings including implications for policy, methods, theory, and/or practice.
 - Description of the limitations of the study's claims.
 - Brief discussion of next steps/future work based on the findings from this study.

Design Research Paper

A design research paper motivates and details a design intervention, using evidence from the design and implementation process to analyze its results. Data can take numerous forms including interviews, observations, log data, survey results, test results, documents (e.g., state policies, student work, photos of students in their neighborhood, artifacts from the design process), and audio-video recordings of learning environments and interactions. Broadly, design research papers use evidence to contribute to knowledge and/or theory about effective design and design processes. We encourage students to ask their advisors to recommend a few 'exemplary papers' in this genre.

Strong papers and presentations in this genre would attend to each of the following:

- **Clear research questions motivated by literature:** Your design project must be driven by well-defined questions that arise from and are justified by your engagement with existing scholarly work in the Learning Sciences and related fields. Your review of prior research (not a comprehensive review) should be a focused exploration of research that highlights the need for your proposed design or an opportunity to investigate learning or teaching through a design intervention. The motivation should explicitly explain *why* exploring these questions about your design is important based on current knowledge. Questions to Consider:
 - What specific gap, omission, edge or puzzle does my design aim to address, as evidenced by the literature?
 - How does my review of prior research illustrate the rationale and necessity for this design intervention and the questions I am asking?
- **Clear design goals linked to measurement:** Clearly state what you plan your design to achieve regarding learning, teaching, or other relevant educational outcomes. Furthermore, you must explicitly detail how you will determine if your design successfully meets these goals, including the specific methods and metrics you will use for evaluation. Questions to Consider:
 - What are the specific, intended outcomes or goals of this design intervention (e.g., changes in student learning, teacher practice, engagement, environment, opportunities, etc.)?
 - What methods, metrics, or indicators will I use to determine whether design has achieved its intended outcomes? How might I account for unanticipated outcomes?
 - Is there alignment between the design goals, research questions, and methods?
- **A theoretical grounded explanation of the design:** This criterion emphasizes the need to articulate the design in detail, including its key features and components, and explicitly explain how relevant learning theories, design principles, or prior research informed its development. This section should justify the design's structure based on theoretical insights and connect the practical intervention to the broader field of Learning Sciences. Questions to Consider:
 - What are the key components and features of my design? Have I clearly stated the underlying design principles for each decision separate from specifics of its implementation?
 - Have I convincingly argued how the theoretical argument for my design principles builds on to existing research and scholarship in the Learning Sciences?
 - How do these learning theories and design principles directly support a coherent system of design's

features and pedagogical approach?

- **Clear discussion of implementation and findings:** In this section, you should provide a detailed account of how your design intervention was implemented, including any challenges faced during the process and how those challenges were addressed. Describe the context in which the design was enacted, the participants involved, and the specific conditions under which it was tested. Additionally, you should present your findings—what data was collected, how it was analyzed, ethical decisions or considerations that arose, and what the results suggest about the effectiveness of the design in achieving its intended goals. You might also consider additional goals or nuances that become visible through your analysis of implementation. The discussion should also interpret these findings in relation to your original research questions, addressing how the results inform both your design and broader theoretical concepts in the Learning Sciences.

Methodological Innovation Paper

Methodological innovation papers describe new kinds of data or new types of analysis of familiar kinds of data, offering the field new ways to explore research questions. For example, the advent of new computational analyses and the use of multimodal data have each led to a spate of new papers displaying these methods and arguing for their usefulness. But be aware that almost any paper will involve *some* methodological innovation. This is particularly the case with qualitative methods; it is almost always the case that some inventiveness is required. Papers in this genre offer a significant enough innovation that it can be considered the primary contribution of the project.

Strong papers and presentations in this genre would attend to each of the following:

- **Describe the state of the art.** You won't be inventing a new method from scratch. Instead, you will presumably be building on an existing methodological tradition. You should describe the history of that tradition and explain how it works. You should also here lay the groundwork for your innovation by suggesting some of the limits or edges of the existing tradition.
- **Explain the innovation.** Describe the parts of your innovation that are new. To some extent the reader will learn about your method through your exemplification, but you should still try to describe it in the abstract.
- **Exemplify the use of the method with an (often small) corpus of data.** Nestled within your methodological innovation paper is essentially a mini version of an empirical paper. All of the elements should be there! (See empirical study genre above.) However, the bar will be a little lower, across the board, than for a straight empirical paper. The amount of data that is analyzed will typically be a little less and it is less important that you establish that the result is a contribution to the field.
- **Describe what becomes newly visible through the use of this methodological approach.** After you have exemplified the method, you should reflect on what we learned about the new method. What aspects of your data were made visible that would not have been visible otherwise? How might such a methodological innovation support new theoretical perspectives or design possibilities? What new questions, challenges, possibilities and ethical considerations might arise with its use?
- **Explain the situations that the method can be applied to and argue for its usefulness.** Here it will be important to establish that your method can be applied more broadly than the limited context in which you exemplified the approach. Expand on the methodological implications for other researchers, studies, contexts, and/or conceptual spaces.

3.3 Dissertation Proposal and Proposal Defense

The dissertation proposal is a document that describes and justifies a plan for a research project to be completed by the student. This research project will be the basis for the PhD dissertation. The proposal must lay out a line of research that will make a substantial contribution to an important area of the Learning Sciences. It must explain how the research builds on prior work in the field and describe the plan of research in sufficient detail to allow a faculty committee to determine if the work is designed appropriately to meet its goals, and if its results will represent a sufficient contribution to the Learning Sciences to merit a doctorate from Northwestern's Learning Sciences Program.

The dissertation proposal is reviewed by a dissertation committee. The dissertation committee is chaired by the student's advisor. At least two of the members on a student's dissertation committee must be LS professors. The remaining requirements for the [composition of a committee](#) is specified on The Graduate School website.

When the dissertation committee feels the student is ready, a proposal defense is scheduled. The scheduling of this defense should be done in consultation with the advisor and the committee. Details of the scheduling should be provided to the [SESP Doctoral Student Affairs Program Assistant](#).

Note: The composition of committee and schedule of the defense must stay in line with requirements outlined on [The Graduate School website](#).

The Proposal Defense

There is no set format for the proposal defense. However, historically, defenses have followed something like the following format: (1) The candidate is asked to leave the room, and the committee briefly discusses procedural issues. (2) The candidate returns. Sometimes, at this point, the candidate gives a brief presentation, summarizing the proposal (~15 minutes). (3) There is an extended discussion during which members of the committee raise issues. (4) The candidate is again asked to leave the room, and the committee deliberates to reach a final decision.

The proposal defense is, more than anything else, a working meeting. The point is not to grill the candidate. Instead, the committee works with the candidate to ensure that there is a plan for a viable thesis.

Outcome

At the conclusion of a proposal defense, a student may pass or may be required to revise the proposal document and/or defend it again.

Once a student has passed the proposal defense and completed the other requirements for candidacy, he or she is admitted to candidacy. Again, students are responsible for knowing the [requirements for candidacy](#) and for obtaining any necessary paperwork for scheduling a defense from The Graduate School. Students should be aware that what we call the "Proposal Defense" within the Learning Sciences Program is called the "Prospectus" by The Graduate School. Students should complete the ["Prospectus" form in GSP](#) upon completion of this milestone.

4. Endgame: PhD Dissertation and Defense

The PhD dissertation is the culmination of a graduate career. A dissertation represents a substantial piece of work that makes a contribution to the field of Learning Sciences. The dissertation is submitted to the student's dissertation committee for review.

4.1 The Pre-Defense

It is up to the committee to determine when the dissertation is ready to be defended. In the past this was handled somewhat informally. More recently, an additional step has been added, what has come to be called the "pre-defense." As of the time of this writing, the pre-defense is not officially required. But it has become the norm.

The purpose of the pre-defense is for the committee to convene to determine whether the candidate is ready for the public defense. Prior to the defense, a complete draft of the dissertation is distributed to the committee. Then the committee and candidate meet to discuss the draft.

There is no set format for the pre-defense. But it typically follows a format much like a proposal defense: (1) The candidate is asked to leave the room, and the committee briefly discusses procedural issues. (2) The candidate returns. Sometimes, at this point, the candidate gives a brief presentation, summarizing the proposal (~15 minutes). (3) There is an extended discussion during which members of the committee raise issues. (4) The candidate is again asked to leave the room, and the committee deliberates to reach a final decision.

Once the committee has determined that the dissertation is ready to be defended, the student can schedule a dissertation defense.

4.2 Scheduling and Preparation

Graduate students must consult with the SESP Doctoral Student Affairs Program Assistant in scheduling the defense to make sure it does not conflict with any major holidays or SESP events. Once it is scheduled, the Program Assistant adds it to the SESP calendar and gives advance notice to the LS academic faculty.

The PhD defense time and date must be announced 2 weeks in advance to all LS faculty, postdocs, and PhD students via email. The student should send all the information (date, time, location, title, committee members, and abstract) to the SESP Doctoral Student Affairs [Program Assistant](#) before this 2-week deadline. The Program Assistant will send the notification. The Program Assistant will also send an advance notification and a reminder 2-3 days in advance.

An electronic copy of the dissertation must be given to the SESP Doctoral Student Affairs [Program Assistant](#) at least 2 weeks before the defense so that all interested faculty may read it in advance.

The defense itself consists of a public presentation followed by private discussions.

4.3 Public Presentation

The primary audience for the defense presentation is the LS faculty. Other members of the LS community (students, postdocs, and other researchers) are invited to attend the defense presentation as observers. Only faculty members and members of the students' dissertation committee are invited to ask questions or comment at the defense presentation.

The defense presentation consists of: A 45 minute presentation that presents and defends the findings of the dissertation. Students should be careful to allocate sufficient time to present their findings. Questions during this time will be limited to clarification questions.

- A 15-20 minute question-and-answer session between faculty and committee members and the student.

A faculty member who is not a member of the student's committee will serve as the chair of the defense presentation. The chair will keep time and serve as moderator for questions.

At the conclusion of the public presentation, the observers leave the room.

4.4 Private Discussion

If any faculty member requests it, there may be an additional question-and-answer session with the student after the outside observers leave. This session is limited to 15-20 minutes. Following this private q-and-a, there is a private discussion among the faculty and the student's dissertation committee without the student in the room. This discussion provides an opportunity for the faculty to provide their feedback on the defense and/or the dissertation to the dissertation committee. There is no predetermined time limit for this discussion.

Following this discussion, the student is invited to return to the room for a discussion of the dissertation with the dissertation committee and any faculty who choose to attend.

There is no predetermined time limit for this discussion.

4.5 Outcome

At the conclusion of the discussion, the student leaves the room for a period during which the committee makes a decision about the outcome of the defense.

A student may pass the defense with no conditions, or may be asked to revise the dissertation, repeat the defense presentation, repeat the discussion, or some combination of these or other conditions that the committee feels are appropriate.

4.6 Submission of the Dissertation

Once the dissertation has been approved by the committee, the student prepares the dissertation for submission. Students should obtain [guidelines for submission](#) from The Graduate School and be aware of all deadlines for submission. The student must fill out the form entitled "TGS Final Exam" and receive signatures from all dissertation committee members. This form is available on [GSP](#) it should be submitted to the Program Assistant.

5. Financial Support

All PhD students in the Learning Sciences Program are guaranteed funding for five academic years (9 months per year) in addition to funding for four summers (3 months per year), contingent on their making satisfactory progress toward the PhD. This funding includes tuition and stipend.

For the most part, the amount of school year stipends is the same, regardless of their source, and is based on a level established by The Graduate School and the School of Education and Social Policy.

There are several sources of student fellowships that have different conditions. These are described in general below, but students are responsible for investigating and understanding the details of their funding.

5.1 University Fellowships

University Fellowships (UF's) are awarded and funded by The Graduate School. Nearly all first year LS students are supported by University Fellowships. UF's are provided by The Graduate School as part of their support for the program. A student who is being funded on a University Fellowship must be in good academic standing and is not permitted to engage in outside work for income. Students awarded a UF receive a letter from The Graduate School describing the requirements and conditions associated with that funding. Any questions regarding these requirements and conditions should be addressed to the Program Coordinator or [The Graduate School](#).

Three-month summer UF's are available for students who are being supported by a TA-ship during the year, or for students who have no other sources of funding for the summer months. A student must apply during the spring quarter for a summer UF.

First year University Fellowships include an automatic 3-month summer fellowship. In many cases, students are able to supplement a summer UF with other funding, such as a partial Research Assistantship (RA). First year students should contact their advisor about the possibility of supplementary summer funding. If the advisor is unable to provide supplementary funding, the student should contact the Program Coordinator, who may be able to locate a source of supplementary funding.

5.2 Research Assistantships

Research assistantships are awarded to students who assist faculty members on research projects either at the university or in the field while continuing the University's academic mission and their own academic development and training.

Requirements:

If the assistantship is funded through a sponsored agreement, then the graduate student must be conducting activities necessary to the sponsored agreement. Research Assistants work 18-20 hours per week.

The work performed as a research assistant is not only part of the faculty member's research project, but can also support the student's dissertation research (or preparation for that research) while satisfying a degree requirement.

Students pursuing their Research Assistantship also need to review the Regulations Governing Recipients of University Assistance. TGS recommends guidelines for relationships between faculty and their RAs. [See best practices for graduate Research Assistants \(RAs\).](#)

5.3 Teaching Assistantships

A Teaching Assistant (TA) fellowship is provided to a graduate student in exchange for assisting an instructor with teaching a course. Like an RA, a TA requires specific work.

A student funded as a TA should clarify what his or her responsibilities are with the instructor. Typically, it involves helping to plan the course, facilitating course organization and communication with students, preparing materials for the class, grading and providing feedback to students, and assisting with in-class instruction. Students funded on a TA fellowship are required to TA one course per quarter while they are on the fellowship. TA positions generally require 15-20 hours/week of work.

TA fellowships are awarded by SESP and funded by The Graduate School. Students should check with The Graduate School for requirements and conditions associated with [TA fellowships](#).

5.4 Other Fellowships

Additional fellowship opportunities are available from both university and outside sources. These include both Research and Dissertation Year Fellowships. A Research Fellowship is typically awarded by an outside organization to a student directly, based on a program of research he or she proposes. While outside research fellowships are awarded directly to students, they are typically administered by The Graduate School, meaning the money is given to The Graduate School, who pays the tuition and stipend from that award. The Graduate School also offers internally funded research fellowships to students engaged in field research. Even though all PhD students are guaranteed five years of funding by the program, they are encouraged to seek research fellowships because of the prestige and the flexibility they bring to the student.

SESP Dissertation Year Fellowships are awarded to students to support their completion of the program. The goal is to support students in writing up their dissertation. To be eligible for this funding, a student must defend their dissertation proposal and fill out the prospectus form in GSP. SESP dissertation fellowships are only guaranteed through the 5th year (20th quarter) of active enrollment. After that time, SESP will try to fund students, but it is not guaranteed.

In addition to the funding from SESP, [The Graduate School](#) offers several different Dissertation Year Fellowships, as do outside organizations, such as the [Spencer Foundation](#).

6. Additional Requirements

6.1 Participation in Community Activities

The Learning Sciences Community

The Learning Sciences Program at Northwestern is a learning community made up of graduate students, research scientists, post-doctoral fellows, undergraduates, and professional staff. The PhD students play an important role in this community. The LS community is enriched by their presence, and the grad students' education is enriched by participation in the community. To maintain the health of that community, the faculty have the following expectations of all PhD students:

- Students will be present in Annenberg Hall as much as possible during working hours throughout the school year and the summer.
- Students will attend and actively participate in all public events sponsored by the Learning Sciences Program and SESP, including brown bags, colloquia, job talks, and dissertation defenses.
- Students will participate in public events sponsored by the other programs associated with the school (e.g., HDSP, IPR, MPES, CLOC), the Cognitive Science Program, or other units on campus that are relevant to their particular interests and research.
- Students who have personal or family reasons for exceptions to these expectations should consult with their advisors.
- There is a strong expectation of participation in the community with the goal of fostering an environment conducive to effective and innovative research programs.

The Broader Research Community

As part of their career development, PhD students should participate in the broader research community by attending and presenting at research meetings (conferences and workshops), publishing papers, participating in the organization of meetings, and reviewing for publications and conferences. Students should consult with their advisors and faculty about an appropriate plan for them to participate in the broader research community, including understanding which conferences, workshops, and publications are appropriate for their research interests and career goals.

To encourage students to attend research meetings, the School of Education and Social Policy offers \$400 per year to each student to attend the conference of his or her choice. Students should work with the Doctoral student affairs team to book conference registrations and travel.

In addition, The Graduate School offers travel support for students who are presenting at a conference, and this support can be used to supplement the SESP support. For information on this travel support, check the [Conference Travel Grant](#) page on The Graduate School website.

6.2 Teaching

To support their professional development, all LS PhD students are required to serve as a teaching assistant (TA) for at least two courses during their graduate career. As part of this apprenticeship, students should expect to be involved in all aspects of the planning, management, and assessment in collaboration with the professor. In their second teaching assistantship, students can expect to be responsible for teaching at least one class session or

week of the course.

Students may have the opportunity to TA beyond their requirement, and if so, will be paid an honorarium of \$2,000; this opportunity must be cleared with the student's advisor and the Program Coordinator. Students may only work up to 20 hours a week so students on RAship and some other types of funding are not eligible to take on additional work. Megan Redfearn can help a student determine if this might be a good fit for them.

Annual Performance Review

Every spring quarter, each student is required to submit an annual progress report in GSP describing the progress that student has made during the past year and the student's goals for the coming year. As part of this process, the student should make sure they have added their advisor in GSP, so the advisor may view the student's progress. The faculty reviews these reports and other evidence of students' progress, including coursework, research activities, publications, presentations, and other professional activities. Following this review, each student receives a letter with feedback from the faculty about the student's progress and suggestions for the coming year. Students whom the faculty feel are not making satisfactory progress will be notified of this as part of this review process.

Note: Late submission of the annual progress report is frowned upon and discussed as part of the performance review procedures.

Purposes of annual performance review:

Manage program progress.

Support students in self-reflection about their own progress.

Develop students' professional practice of annual updates of their CVs.

Provides substance for ongoing faculty conversation about student progress.

Goal setting and feedback for the future year.

6.3 LS Policy on Residency at Northwestern

Summer Residence

The summer quarter is part of the academic year for PhD students in the Learning Sciences. Students are expected to be engaged in research and scholarship full-time during the summer. Except for students participating in field work or internships that require them to be elsewhere, students are expected to be present on campus during working hours throughout the summer. Eligibility for summer funding is contingent on residency. However, students are entitled to time off for vacation time during the summer. The length and timing of that vacation should be set in consultation with your advisor.

Leaving Northwestern Prior to Completion of Degree

In recent years, LS PhD students have occasionally requested permission to leave the Chicago area before completing the requirements for the degree and to continue working on their degrees from remote locations. These departures typically happen for one of two reasons. Either the student has a personal reason to be away from Evanston for extended periods of time, or the student accepts a job before they have completed their degree.

This is a matter of serious concern for the faculty. We understand the competing pressures in students' lives and recognize their need to make decisions that balance those pressures according to their personal priorities. However, the faculty believe these absences carry significant costs for the students' career development. It is our experience that students who leave take longer to complete their degrees, have a much higher likelihood of never completing their degrees, and tend to produce lower quality dissertations. Students who leave early lose the opportunity for informal exchange with faculty and other students, miss opportunities to attend talks and meet with visitors, and lose the chance to gain valuable experience mentoring more junior students. The faculty and university make substantial investments of time and resources in graduate student education. We feel a great loss when students do not complete their degrees, and we are disappointed when students do not work at the level of their potential.

In addition, the absence of senior graduate students comes at a substantial cost to the LS community. The faculty believe that the ongoing success of the Learning Sciences Program depends on our maintaining an active, vibrant community in Annenberg Hall, so the departure of senior graduate students is a serious concern for us.

Note: This concern does not apply to students who must take a temporary leave from the program for medical or personal reasons. This applies to students who are active in the program but are requesting to be absent from campus for extended periods of time.

6.4 Academic Integrity

The Learning Sciences PhD program adheres to and endorses [The Graduate School's policies on academic integrity](#) as detailed on the academic integrity page of the [Office of the Provost's website](#).

In cases for which violations of academic integrity is expected or evidence is found, the program will enact procedures to pursue those cases through the School of Education and Social Policy under the guidance of the Dean, Coordinator, and faculty, as well as through The Graduate School as appropriate.

Nondiscrimination Statement

Northwestern University does not discriminate or permit discrimination by any member of its community against any individual on the basis of race, color, religion, national origin, sex, pregnancy, sexual orientation, gender identity, gender expression, parental status, marital status, age, disability, citizenship status, veteran status, genetic information, reproductive health decision making, or any other classification protected by law in matters of admissions, employment, housing, or services or in the educational programs or activities it operates. Harassment, whether verbal, physical, or visual, that is based on any of these characteristics is a form of discrimination. Further prohibited by law is discrimination against any employee and/or job applicant who chooses to inquire about, discuss, or disclose their own compensation or the compensation of another employee or applicant.

Northwestern University complies with federal and state laws that prohibit discrimination based on the protected categories listed above, including Title IX of the Education Amendments of 1972. Title IX requires educational institutions, such as Northwestern, to prohibit discrimination based on sex (including sexual harassment) in the University's educational programs and activities, including in matters of employment and admissions. In addition, Northwestern provides reasonable accommodations to qualified applicants, students, and employees with disabilities and to individuals who are pregnant.

Any alleged violations of this policy or questions with respect to nondiscrimination or reasonable accommodations should be directed to Northwestern's Office of Equity, 1800 Sherman Avenue, Suite 4-500, Evanston, Illinois 60208, 847-467-6165, equity@northwestern.edu.

Questions specific to sex discrimination (including sexual misconduct and sexual harassment) should be directed to Northwestern's Title IX Coordinator in the Office of Equity, 1800 Sherman Avenue, Suite 4-500, Evanston, Illinois 60208, 847-467-6165, TitleIXCoordinator@northwestern.edu.

A person may also file a complaint with the Department of Education's Office for Civil Rights regarding an alleged violation of Title IX by visiting www2.ed.gov/about/offices/list/ocr/complaintintro.html or calling 800-421-3481. Inquiries about the application of Title IX to Northwestern may be referred to Northwestern's Title IX Coordinator, the United States Department of Education's Assistant Secretary for Civil Rights, or both.