

How to Start: Thinking of a Problem and the Questions It Raises

Often the most difficult yet important stage in a SoTL project is the initial phase, choosing a “problem” ([Bass](#)) to investigate and then developing your research question(s). First, you want to choose a “problem” that

- is meaningful and significant to you,
- is possible to research with the time, resources, and students you have, and
- is deliberate, narrow, and focused, so that your project will adequately answer your research question.

Take time to reflect on your problem, and consider how it is contextualized within your specific student body, institution, and discipline. Writing a page about these issues will help you in the future as you think back on your beginnings and prepare to go public.

Now that you have reflected on your problem, what questions does it raise? Revisit [Hutchings’s taxonomy](#) to brainstorm a variety of questions, looking at your problem from multiple angles. (See the examples in the box to the left.) How would they map onto Hutchings’s taxonomy?

Problem: My students have trouble with x (a concept, a skill, etc.).

- What do they understand about x? What does it look like to understand it?
- What do they not understand about it? What are their misconceptions, bottlenecks, mental roadblocks about it? What do these difficulties look like?
- Why do they have difficulty with it? What are the sources of these struggles?
- What are the consequences of the misconceptions?
- How can I help students understand x?
- Does this intervention of z help them understand it? Does doing z improve students’ understanding, ability, persistence?

Keep in mind that you really can’t “fix” something until you understand what’s happening in the first place, so if you gravitate toward “what works?” questions, you’ll need to do a lit review to learn “what is” going on as this problem occurs.

Once you have decided on the type of SoTL question you’re asking, you’ll need to begin planning your project design.

Consider the following logistics:

Timeframe

Are you facing a deadline as part of a SoTL program, grant, or other source? If so, how long do you have? How and *when* will you collect the data you need in the time you have? To answer your question within your timeframe, will you need...

- a single snapshot of a point in time?
- a cross-section of all the students in the class?
- a longitudinal study of students over the course of the semester?
- a thick description of a single assignment or class period?
- a case study of one student’s progress?
- a large number of students?

Think carefully about what’s feasible in the time and resources you have, and how you can incorporate your methods of collecting evidence of student learning into the normal schedule of your course.

Access to Students

Not all courses allow the same flexibility with the curriculum, assessments, and time as others. While the instructor of record for a course will have the most access, it is possible to do SoTL projects as the teaching assistant, guest lecturer, or even student—with the instructor of record's permission, of course. Consider the following:

- What access do you have to students?
- In what aspects of the course do you have influence? How can you use those aspects to design and carry out your project?
- How can you incorporate your assessments or data collection into the existing structure of the course?

Researchers

Many SoTL projects are conducted by collaborative teams from within a single discipline, a range of disciplines, and/or a variety of ranks, roles, or statuses.

- Will you do this project on your own? (Don't worry: many SoTL projects are done this way, too.)

If collaborating with others makes sense, consider the following:

- Would a colleague from a different discipline effectively complement your strengths (e.g., a quantitative researcher partnering with a qualitative one, a humanist with a social scientist, someone new to the institution working with an established senior colleague)?
- Would a student's perspective,¹ or a librarian's skills, or someone from student services be a relevant partner for your specific project?
- What role will each of you play? Decide up front.

Examples of SoTL Projects

A "What Is?" Project

... begins with questions that seek to describe but not evaluate: What's happening in the classroom? What are students thinking when they __?

- Many of my literature students don't handle reading difficult literary texts well. They get frustrated. They blame the text/author for their frustration ("poetry is hard," "this story is stupid," "that author is a bad writer") and often quit trying. At best, they may go to the internet or a classmate to find out "what it means." Literary scholars relish this challenge of making meaning of difficult texts, and many of the most widely read literary works are indeed challenging. Rather than assuming my students are lazy or have short attention spans, I want to go know what's really going on when they come upon a text they consider difficult. What are they thinking?
- I will assign a "difficulty log" (Salvatori & Donahue, 2004) in my class three times throughout the semester—early, middle, end—when the students will be reading texts I know they find difficult. In this log, students will reflect upon and write about a) precisely what they consider difficult in the assigned text, b) how they responded to the experience of reading it, and c) what meaning they were able to make of the text.

¹ The video to the right offers reasons [why integrating students into SoTL projects is effective](#).



- I will analyze their anonymous logs, looking for themes or patterns in their responses. From these logs, I will document specific types of difficulty from their perspective and understand more broadly what thinking processes they go through (and don't) during these key disciplinary moments.
- My hope is that I'll discover something about their preconceptions about reading literature that will help literature instructors guide future students more successfully through this process.

A "What Works?" Project

... begins with questions that seek evidence about the effectiveness of specific teaching strategies or approaches: Will students understand this concept/apply this skill more effectively if they do x, instead of the y I've assigned in the past?

- I suspect that too many students in my calculus class solve problems by memorizing formulas and plugging them in when they come across familiar problem types. They don't do well when I assign new, less familiar problems, and most can't articulate their process when I ask them to explain how they solved a problem. I know that developing these metacognitive skills (the ability to think about and articulate how they think about a problem) is key to transferring their knowledge to new situations. Will assigning a metacognitive activity as part of their regular work improve their problem-solving ability?
- I will assign the "Documented Problem Solutions" classroom assessment technique (Angelo & Cross, 1993) in which students write out the steps they take as they solve a problem. Students will then share them in class and, in small groups, attempt to solve new problems by comparing and attempting the steps each group member had documented.
- I will measure the effectiveness of this activity by looking at their scores on the test prior to and then after the activity. The post-test will include another Documented Problem Solution, which I'll compare with their first versions to see if their metacognitive explanations of their problem-solving steps improved.
- Through a low-stakes, collaborative, metacognitive activity that will require students to practice, articulate, share, test, and correct their processes, I hope to demonstrate an improvement in students' problem-solving skills.

Situating Your Project within Larger Conversations: Doing a Lit Review

Lit reviews involve researching relevant previous work to establish your credibility, build on rather than simply repeat others' work, and demonstrate the need for and significance of your project. Lit reviews are ongoing and iterative. Consider the following questions as you begin:

- If others have asked your same question(s), how have they answered them? In what contexts? What did they find? How might your study complement theirs or fill in some gaps?
- If you're undertaking a "what works?" project, what does the research say about "what is?" What previous work helps you understand and not simply make assumptions about the context for your intervention?
- What theories of learning and findings from the learning sciences are relevant to your project?
- What related SoTL work would inform your project? What about disciplinary research?

The answers to these questions should guide your work.

Research Guide

Vanderbilt University's the Center for Teaching and the Heard Library have a [research guide for SoTL](#)¹ with resources to facilitate your lit review,² particularly the following:



- **Finding Books:** links to Vanderbilt's ACORN catalog and interlibrary loan sites
- **Finding Articles:** links to the major databases that index articles about teaching and learning, as well as surveys, measures, and questionnaires
- **SoTL Journals:** links to the top SoTL journals, as well as lists of SoTL journals by discipline
- **More about SoTL:** links to useful introductory readings about SoTL, as well as links to a few SoTL programs (Vanderbilt and elsewhere) and its relevant professional organizations

¹ The SoTL Research Guide was created by Vanderbilt University's [Nancy Chick](#) (Center for Teaching), [Melinda Brown](#) (Central Library), and [Lee Ann Lannom](#) (Peabody Library).

² Materials indicated by ★ are only available to Vanderbilt students, faculty, and staff.

Doing Ethical Research: SoTL and the IRB

Normal Practice & Research Additions

With any research project, you should think of the ethical issues surrounding your work. When dealing with research on teaching and learning, IRBs distinguish between activities that are part of “normal educational practices” and other research activities.

- What are you asking of students that they might be doing as part of the course, whether or not you were conducting your project? These are “normal educational practices.”
- What are you asking of students that is above and beyond the normal course work? These are research activities that will be subject to closer scrutiny by the IRB.

Example

If you plan to do a close reading of your students’ answers to a particular essay question on the first exam to look for patterns in their thinking, then what you are asking of your students—having them answer the essay question—is part of “normal educational practices” associated with the course. They would be doing that work whether or not you were conducting your study. If you also ask them a follow-up question after the exam, asking them to reflect on what course components (lecture, discussion section, textbook, etc.) helped them answer that essay question, then you are *also* asking them to do something above and beyond “normal educational practices” associated with the course.

When you apply for IRB approval, be clear about which of your project activities are normal educational practices and which are research activities.

Informed Consent

If you are asking your students to participate in activities beyond your normal practices, you are asking them to participate in research. In such cases, students should be informed of the advantages and disadvantages of participating in such extra or unusual activities, as well as any associated risks. Students then should be given the opportunity to opt out of participation—without penalty.

The IRB will want to know how you plan to tell your students about their participation in your study: are you giving them enough information to give you their “informed consent” to include them in your study? While signed consent forms aren’t always required, the principle of informed consent is more than an issue of policy; it’s a larger ethical one, so many researchers choose to obtain their students’ consent whether required or not.

Risk to Students

Regardless of the pursuit of IRB approval, the fact that humans, and especially students, are involved means there are several ethical issues to consider. Ultimately, the basis behind all human subject research (medical, psychological, SoTL, etc.) is the spirit of the Hippocratic oath: do no harm. It may seem counterintuitive to think that improving your teaching through research may put students at risk, but there are two main risks: risk to their grades and learning, and risk to their privacy.

Risk to Student’s Grades & Learning


Be clear that your students’ participation in your study will not jeopardize their grades or their learning. Since normal educational practices are part of the regular learning experience, they create no more risk to learning or grades than students would expect to encounter in any course, but participation in activities beyond

normal practices can create minimal risk to their learning or grades (e.g., participation in the part of a study with what turns out to be a less effective learning strategy).

Risk to Student's Privacy

As sociologist and SoTL scholar Kathleen McKinney explains, “Participants in our research have the right to expect that their data or responses or behavior in the study be kept private” (2007, p. 63). To maintain students’ privacy, you can de-identify the data, so it can’t be connected with a particular student. This includes direct information like names, as well as indirect identifiers like hometowns, majors, etc. Another option is to collect anonymous data when possible. When neither of these strategies is possible, their identities should be kept confidential.


Example¹



You survey your students about their reading strategies and study habits. Suppose that you only have two female students in your class. If you include your students’ sex in your data set, a third party with access to your class rolls might be able to determine which survey responses belong to each of your two female students.¹

De-identifying your data doesn’t mean that you won’t know individual student identities as you conduct your project. Instead, it means that if a third party (perhaps a colleague at another school interested in your project) wanted to see your data, you would need to be able to provide a de-identified set of data that would enable that third party to verify your analysis of the data, so make sure that any results you share publicly don’t inadvertently reveal individual student identities.

Example²



You survey your students about their textbook reading strategies and want to compare their answers to their performance on a midterm exam. Your data set might include the fact that a student named John Smith uses a certain reading strategy and made a C on the midterm. While you are interested in knowing that his reading strategy is correlated with that specific grade, you won’t include his name in your de-identified set of data. Instead, you can assign random numbers to all your students, so your de-identified set of data includes the fact that Student 12 used that reading strategy and scored a C. This way, a third party could verify the correlations you find without identifying particular students. Additionally, if you set aside or don’t see the students’ number assignments, you won’t risk bringing other knowledge about the students (how John Smith did on subsequent exams) to your analysis.

¹ Course registration information is considered protected educational information by the Family Educational Rights and Privacy Act (FERPA), a federal law protecting student privacy in educational settings. Thus, only your institution’s faculty and staff with a “legitimate educational interest” have access to course registration information, so only they might be able to identify your students in this case. However, although they might have a “legitimate educational interest” to know which students are taking your course, they don’t have a “legitimate educational interest” to know your students’ individual responses to your survey. Additionally, the identity of your two female students may be common knowledge to their friends, family, and other peers, rendering their responses—if identified as by women—identifiable.

² Be sure not to inadvertently identify your students when you assign them numbers. For instance, don’t use their social security numbers or the numbers according to their alphabetical order on your class roster.

In some cases, it may not be possible to de-identify your data, as when videotaping students. When de-identifying your data is not possible, be clear how participation in your project poses minimal risk.

Click the “IRB” tab on the [SoTL Research Guide](#) prepared by Vanderbilt University’s Center for Teaching and Heard Library for the following additional information:

- A few key explanations of the relationship between SoTL and the IRB,
- Vanderbilt’s IRB policies and forms,
- An annotated (Vanderbilt University) IRB form with advice and examples

Gathering Evidence: Making Student Learning Visible

Gathering Evidence of Student Learning

How will you collect evidence of relevant student thinking and learning (i.e., data) that will answer your specific question(s)? First, consider how you know what your students are learning.

- Does doing well on a test mean they've really *learned* the material?
- How do you *measure* and *make sense* of what they're really learning?
- How can you gather evidence of their thinking at earlier stages of their learning process, not just in the final, summative assessments like essays and exams?

Use these questions to guide your selection of your project's assessment techniques—or how you'll make student learning visible. See some possibilities in the table to the right.¹

No matter what form you choose, the *most important* aspect to consider is how well that evidence you gather responds to your research question.

Direct vs. Indirect Evidence

Direct evidence answers the question, "What did the students learn?"

Examples include the following:²

- Samples of student work (essays, exams, in-class writings, lab reports, quizzes, portfolios, online assignments, etc.)
- Observations of students (in person, videotape, audiotape, online discussions)
- Students' reflections on their own values, attitudes, and beliefs

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

- Responses to survey or interview questions asking students what help them learned (e.g., knowledge surveys)³

Thinking & Learning Made Visible

- Classroom assessment techniques/CATs (minute paper, muddiest point, clicker data)
- Evidence of how students actually think (think-alouds, process logs, reflective journals, concept maps)
- Exam scores, or scores on a single exam question
- Counts (online postings, office visits, number of pages read/written, hours studying, etc.)
- Samples of students' work (papers, journals, projects, presentations, performances, recorded or online group discussions)
- Institutional research data (grades, GPAs, admissions scores, retention rates, etc.)
- Students' reports of their learning (surveys, interviews, focus groups [indirect evidence])

¹ For information on other classroom assessment techniques/CATs, see Vanderbilt Center for Teaching's [guide on CATs](#). For more information on using clickers to facilitate CATs, see Vanderbilt Center for Teaching's [guide on clickers](#). For more information on think-alouds (an activity in which a student says out loud everything that comes to mind as he or she is solving a math problem, interpreting a historical document, or translating a passage—offering valuable insight into the thinking process), see [this blog post about Lendol Calder's work](#). For information on concept maps, see "[Best Tools and Practices for Concept Mapping](#)."

² These examples are adapted from "Assessing Student Learning: Guidelines for SACS Reaffirmation of Accreditation," a workshop for department chairs and program directors provided by the Vanderbilt Provost Office on January 9, 2007, and the Vanderbilt University Assessment Web Site.

- Responses to survey or interview questions asking students to rate their satisfaction with a learning experience
- Reflections by instructors on student learning and teaching methodologies
- End-of-course grades⁴

Indirect evidence should always be complemented by direct evidence.

Aim for a variety of types of evidence, or multiple data sets, to provide a richer picture of the learning. Some of the strongest SoTL projects draw on the complementary pairing of quantitative *and* qualitative data.

Quantitative and Qualitative Data

Quantitative data is evidence of student learning in numerical form and is usually analyzed using descriptive and inferential statistics. Qualitative data is evidence of student learning in textual, verbal, or visual form and is most often analyzed qualitatively (interpretive text analysis for meaning, themes, patterns), but it can also be analyzed quantitatively (content analysis counting the frequency of an idea, phrase, theme, or pattern).

When working with people, neither type of data is better than the other, and it's often best to have both. For instance, if you use a pre- and post-test to measure the effectiveness of an intervention and see a major improvement, qualitative data (e.g., open-ended surveys, interviews, focus groups, think-alouds, essay questions) will help you identify what contributed to the difference—and what it looks like.

Quantitative Data

- Questionnaire/survey (e.g., Likert scale)
- Quasi-experiments
- Content analysis
- Secondary data (test data, student records)

Qualitative Data

- Questionnaire/survey (open-ended ?s)
- Text/discourse analysis
- Interviews
- Focus groups
- Observations
- Case study analysis
- Think-alouds/protocol analysis

³ For more information on knowledge surveys (tools for exploring students' confidence in their ability to solve problems and answer questions in a particular course), see "[The Knowledge Survey: A Tool for All Reasons.](#)"

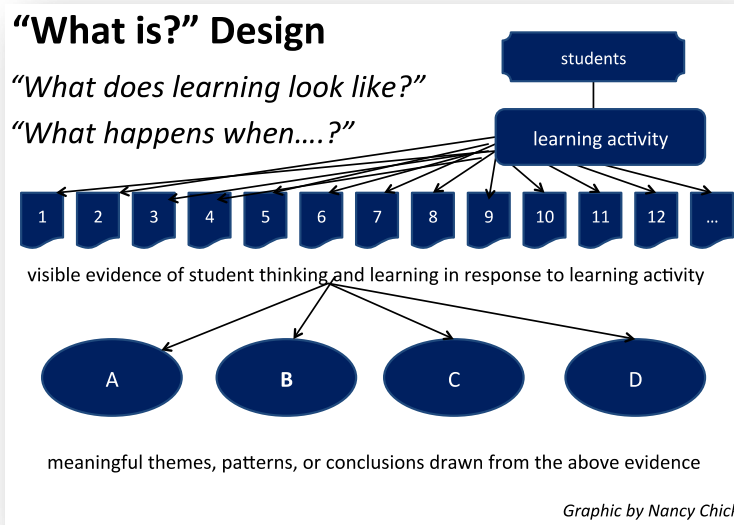
⁴ Course grades are considered indirect evidence because they're synthesized over an entire course and often include non-learning measures like participation. Without detailed context and planning, it can be difficult to match a student's grade in a course to a specific learning activity or goal.

Project Design: Structuring the Learning Activities and Data Collection

“What Is?” Projects

“What is?” SoTL projects don’t revolve around an intervention, comparison, or evaluation of effectiveness. Instead, their purpose is to describe what’s happening or what moments of learning look like, drawing from direct evidence of student thinking and learning. (See model below [Chick, 2008].) They also don’t require large numbers of students. In smaller classes, a case study approach in which you closely unpack the learning of fewer students may work best. These projects will be highly descriptive of the specific learning context (what kind of course? who are the students? what kind of institution? where?), the evidence of learning (with plenty of examples, including ideally those representing students’ actual voices), and the analysis of that evidence (how does the evidence help answer your research question?).

These projects tend to be more qualitative and are particularly good for answering “how” and “why” research questions, focusing on the individual and collective experiences of the students involved. In *Qualitative Research: A Guide to Design and Implementation* (2009), Sharan B. Merriam adds, “Qualitative case studies share with other forms of qualitative research the search for meaning and understanding, the researcher as the primary instrument of data collection and analysis, an inductive investigative strategy, and the end product being richly descriptive” (2009, p. 39).

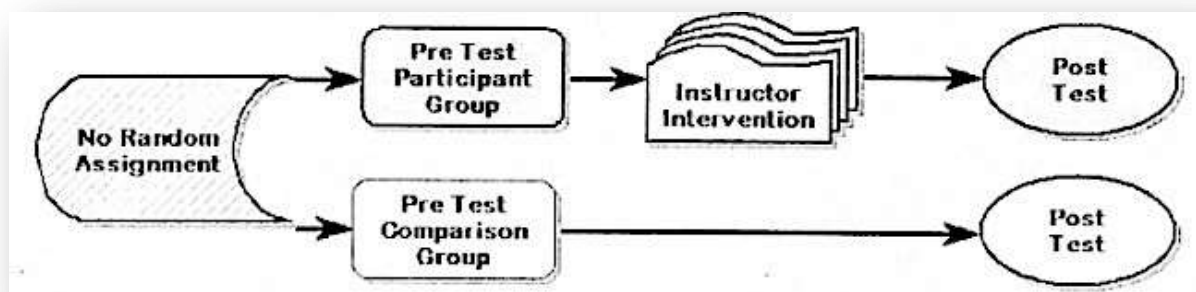


There are many ways to design such a project. The tips below may help in the design process:

- Look for patterns across samples of student work (one set, selections from multiple sets).
- Follow selected students’ development of a single assignment over the semester.
- Track selected students’ performance on several assignments over the semester.
- Use a variety of assessment methods to obtain a rich and multifaceted view of the students’ thinking and learning—at a variety of stages.
- Keep in mind that interesting results may emerge in subgroups of your student population, so don’t lose sight of your specific context’s demographics.

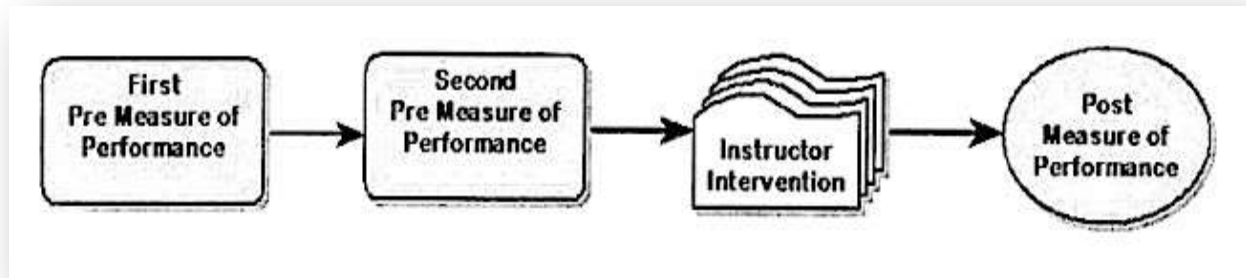
“What Works?” Projects

“What works?” SoTL projects are organized around comparisons that measure the effectiveness of an



approach or activity. You don't need access to two sections of the same course for such a project. Instead, you can split one class into two groups: one that receives one type of assignment or intervention and one that doesn't. (See model on previous page [Brown, 2006].)

If it's not feasible to split a class into two groups, there are alternatives when working with one group of students. By adding two pretests to the intervention, you can validate your pretest data to improve the chances that any changes seen in the post-test result from the intervention.



For more information on qualitative and quantitative approaches, see the National Science Foundation's [User-Friendly Handbook for Mixed Method Evaluations](#).

Analyzing the Evidence: What It Reveals about Student Learning

You've now gathered some evidence of student learning, ideally a variety. Now comes the analysis of this evidence. How does it help you answer your research question? Think carefully about the kinds of answers your research question seeks, such as

- **frequency** (how many students who did **x**, number of instances of **y** in the data or high grades or “strongly agree” responses, number of attempts at **z**, etc)
- **change in numbers** (increase in high grades, number of students retained, decrease in affirmative responses to a survey question, etc.)
- **description** (what moments of learning or the lack thereof look like, emerging patterns of behavior, responses in a survey)
- **interpretation** (what the student text means, often grouped in themes; analysis of quality)

You may also draw on a variety of resources for analyzing your data.

First, consider your own expertise. What mode(s) of analysis are at the heart of your training? Remember, SoTL is conducted by disciplinary experts, so draw on your expertise when relevant.

Next, even if you're working on an individual project, colleagues with complementary analytical expertise can be brought in for this stage of the project.¹

Finally, there may be pre-existing tools available to support your work. While you may develop your own, there may already be ready-to-use and potentially more credible resources out there. Possibilities include validated measurement instruments (e.g., surveys, assessments), carefully designed and pretested rubrics (e.g., [AAC&U VALUE Rubrics](#)), previous scholars' identified patterns or coding schemes (e.g., published as the mode of analysis or a typology of findings in a previous study), among others. Use your lit review to identify any existing resources.

¹ Always make sure you formally acknowledge their contributions when you go public with your work in any way.

Going Public: Joining the Larger Conversation

There are several ways to make your work public that accomplish the larger goals of SoTL described in the [“Going Public”](#) section of the SoTL Guide.

Journals: Disciplinary or Multidisciplinary?

You’ll need to decide where you want to submit your article: a disciplinary journal that publishes pedagogical pieces, a SoTL journal that published pieces for a multidisciplinary readership, or an edited book.¹

Publishing within Your Discipline

To find the discipline-specific journals that publish essays about teaching, first check with your major professional organization. Next, you’ll find a few lists of discipline-specific SoTL-friendly journals compiled by various libraries by clicking the “SoTL Journals” tab on the [SoTL Research Guide](#) prepared by Vanderbilt University’s Center for Teaching and the Heard Library. Since each of these lists is incomplete, take the time to look through all of them.

Publishing in a SoTL Journal

To find the top SoTL journals, click the “SoTL Journals” tab on the [SoTL Research Guide](#).

Whichever journal you choose, read its submission guidelines carefully first to make sure your topic is appropriate and then to identify its length requirements, citation style, deadlines, and submission process.

Conferences

As in many disciplines, SoTL practitioners regularly share their work at conferences. These conferences typically feature panels of individual presenters, panels of presenters who’ve worked together on a similar project or project type, and poster sessions. (Unlike some disciplines, the poster is a highly valued genre in SoTL, rich with idea exchange, project reviews, and networking. Some poster sessions display both completed projects and those not quite finished—indicated as such. To see possibilities for how the traditional the academic poster can be adapted to projects from disciplines unfamiliar with this model, [click here](#).) Some also include roundtable discussions, pre-organized but less structured conversations about a topic with a few people serving as the conversation starters, based on their own research or inquiry.

Often, SoTL practitioners present at conferences before writing a manuscript for publication, as part of the process of inviting peer feedback and review. Others, however, present completed, polished projects at these conferences, so there’s an effective mix.

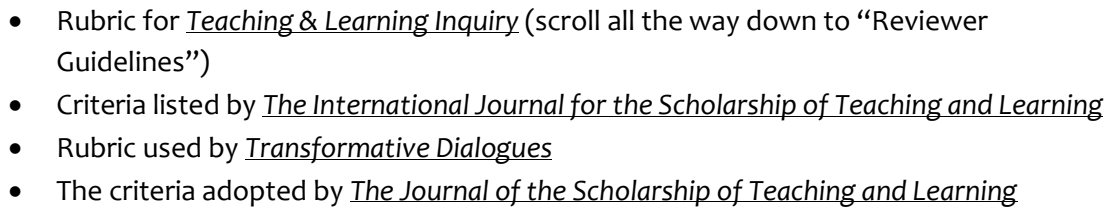
To find a list of the main SoTL conferences in North America, click the “More about SoTL” tab on the [SoTL Research Guide](#).

¹ To publish a chapter in an edited book, you typically respond to a call for proposal or chapters. In this case, the editor will guide you through the process.

Considering Quality: Assessing Your Manuscript

In addition to Felten's and Killen and Gallagher's criteria, journals often share their criteria or even rubrics. A few examples are below.

Rubrics & Criteria from a Few SoTL Journals

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- Rubric for *Teaching & Learning Inquiry* (scroll all the way down to “Reviewer Guidelines”)
 - Criteria listed by *The International Journal for the Scholarship of Teaching and Learning*
 - Rubric used by *Transformative Dialogues*
 - The criteria adopted by *The Journal of the Scholarship of Teaching and Learning*

Use some of these tools to self-assess your manuscript, and offer one as a guide a colleague who's willing to read and respond to your manuscript.