Instructional Scaffolding

Centre for Teaching and Learning
UNIVERSITY OF TORONTO SCARBOROUGH
Acknowledgments
The Centre for Teaching and Learning at UTSC would like to thank UTSC instructors whose assignments are included in this booklet. We would also like to thank CTL staff and coordinators for their contribution.

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University of Toronto Scarborough
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Introduction

In a recent survey conducted in Ontario universities, faculty lamented that many students lack the critical thinking, research, and writing skills demanded in higher education (OCUFA, 2009). This lack was attributed to a variety of causes including increased enrollment, acceptance of more students who typically face greater challenges, such as first-generation and international learners, as well as a lack of preparation in high school.

Even the best prepared students, however, may flounder when coming to university, simply because the expectations and the depth of disciplinary understanding required are that much greater. No longer is simple memorization of basic information adequate; students must now develop a deeper understanding of complex disciplinary concepts, and learn to evaluate and apply them. While most students can gradually develop these skills through practice or ‘osmosis’ over the course of their degree, instructors can help improve student success by implementing an approach often referred to as “scaffolding” into their courses.

Scaffolding is a technique for assignment and course design that provides the necessary support for students, while still fostering independent learning and a deeper understanding of the material. Through effective scaffolding, the instructor can make the process and expectations of disciplinary knowledge and communication transparent to students, which in turn opens up new possibilities for the instructor to create a significant learning experience (Fink, 2003).

This booklet will introduce you to ways to implement scaffolding that will help improve student learning, lead to better quality assignments, and help reduce plagiarism in your courses.
What is Scaffolding?

Scaffolding is an approach to course and assignment design that involves breaking the learning objectives into manageable steps, and providing instructor support throughout the learning process.

The theory behind scaffolding is that when learners first approach a new skill or subject matter, they are able to accomplish much more with support (Bruner, 1966). As they master each step, those supports can gradually be withdrawn, until the learner is able to tackle these tasks completely independently.

Examples of Scaffolding

*Research essay:* Have students submit an annotated bibliography and/or essay outline before the final essay.

*Math problem:* Break a difficult math problem into its component parts.

Scaffolding has been shown to have the following benefits in higher education:

- **Encourages students to start working on major assignments earlier**
Because scaffolding breaks a large or complex assignment into smaller chunks, it is easy to set deadlines early in the term to get students started right away.
• **Helps students meet disciplinary expectations**

Major assignments, such as a literature review, lab report, or research essay, require complex skill sets. Not only do students need to know the course material, they must also understand how to write in the appropriate disciplinary genre, select high-quality and relevant sources, and synthesize and evaluate difficult concepts and evidence. Scaffolding these assignments provides greater opportunity for students to attend to the process of completing an assignment, which then helps them to generate a higher quality product.

• **Provides more opportunities for students to receive formative feedback**

Scaffolding allows you and your TAs to provide clear direction and feedback at each learning stage. This means you are more likely to catch problems early on, instead of in a pile of poorly done assignments at the end of the term. Formative feedback during the early stages gives students a chance to learn from their mistakes and a concrete opportunity to correct them.

• **Promotes academic integrity**

Because students must show their work at each stage of a scaffolded assignment, plagiarism is much more difficult. In addition, students tend to be less overwhelmed by a smaller assignment where they have a much better sense of the expectations, which means they have fewer temptations to copy from each other or outside sources. This is especially true when the earlier stages of the assignment are low-stakes and formative.
• **Results in better quality assignments**

Because scaffolding helps students stay on track right from the beginning, it allows you to ask much more of students and still ensure that the quality of final assignments is much higher!

There is extensive research available which shows that scaffolding improves student success. Please see the articles listed below and the bibliography of this publication for further information.

**Read more:**


How do I get started?

Scaffolding works best if you start at the end of the design process. In other words, begin by identifying learning objectives for your course and then work backwards to select and organize the course material and assessments you will use to help students meet those goals.

Once you’ve written your learning objectives, think about what types of assignments will help students meet them. With these two pieces of information, you are ready to choose the method of scaffolding that offers the best fit for your course.

Create Learning Objectives

A learning objective is a specific piece of knowledge or skill that a learner will acquire by the end of a lecture, assignment, or course. They are most effectively stated as a concrete verb of what the student will be able to *do* by the end of the learning

Some examples of learning objectives:

- Apply [specific disciplinary concepts].
- Evaluate content and argument of [specified] articles or course readings.
- Craft a short research paper synthesizing both primary and secondary sources.
- Recommend and argue for a particular course of action based on thorough analysis of a case study.
When creating learning objectives, consider the following questions:

What course concepts or material do I want my students to master? Articulate the scope of the disciplinary learning that you want your students to achieve. Aim to be as specific and concrete as possible and use these objectives as your end goal.

What level of mastery should they have by the end of the course? Mastery can mean different things depending on the year and level of your class. Do students need to become familiar with terminology and understand basic concepts or should they be able to apply these to new situations? Should they be able to analyze complex readings or synthesize multiple sources to create a reasoned argument? Being clear on what achievements you wish your students to have by the end will help you clarify your expectations.

What non-disciplinary skills will my students need to develop and demonstrate their mastery of course material? Also consider non-discipline specific learning objectives that your students will need to succeed in your course. Will they need strong writing or research skills? Analytic or problem solving skills?

Students often do not have these skills so scaffolding them into your course will help them meet the assignment expectations.

Learn more:

Choose Types of Assignments

Once you have written your learning objectives, you can start thinking about the types of assignments that will best help students practice the skills they will need to meet them.

The more closely aligned your assignments and learning activities are to the learning objectives of your class, the more likely it is that students will be able to develop and demonstrate their level of mastery. As well, students will be more engaged when they see that assignments are directly related to the lectures and other course materials.

When choosing your assignments, consider the following factors:

- **Experience of your students**: How much research experience have your students had? How much academic writing have they done? The past experience of your students will constrain what they will be able to accomplish.

- **Number of students**: Do you have the time/resources to support your class through a lengthy research and writing assignment? Would shorter assignments be more practical? See the next table for ideas for large classes.

- **Your time**: How much time do you have to spend on evaluation? What steps could be taken to save your time? See the FAQ about Scaffolding on page 23-24 for ideas efficiently incorporating scaffolding into your courses.
<table>
<thead>
<tr>
<th>Possible Objectives</th>
<th>Ideas for Large Classes</th>
<th>Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember a term or definition</td>
<td>iClicker questions</td>
<td>Quick and can be used to help break up the lecture</td>
</tr>
<tr>
<td></td>
<td>Self-test quiz</td>
<td></td>
</tr>
<tr>
<td>Improve comprehension of a complex concept</td>
<td>One-minute paper</td>
<td>Can be given in-class or as homework</td>
</tr>
<tr>
<td></td>
<td>Reflection paper</td>
<td>Can be unmarked or given pass/fail grades</td>
</tr>
<tr>
<td></td>
<td>Statement of confusion</td>
<td>Could be submitted simply to help you see where students are having trouble</td>
</tr>
<tr>
<td>Synthesize course concepts throughout the term</td>
<td>Learning journal</td>
<td>Does not require feedback</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Can be submitted periodically and given pass/fail grades</td>
</tr>
<tr>
<td></td>
<td>Peer-review of drafts</td>
<td>Encourages students to learn how to evaluate assignments but the onus is on students, not the instructor or TA</td>
</tr>
</tbody>
</table>

Not familiar with these assignments? Please see the assignment glossary at the end of this booklet.
Methods of Scaffolding

There are many ways to implement scaffolding in your course. Consider the following four methods: process, critical thinking, discipline, and blended.

Method #1: Process Scaffolding

Process scaffolding is ideal for supporting students in the production of a complex assignment that they may not have much experience with. First and second year students who have little experience with university-level assignments and expectations may especially benefit, but process scaffolding can also be used effectively in upper year courses, especially in disciplines that do not require much writing in the early years.

For effective process scaffolding, imagine the finished product and break it down into its component parts:

- Have students submit smaller related assignments or parts of the larger assignment at regular intervals.
- Focus on those parts of the assignment that fit with your learning objectives and/or address areas where you perceive they lack skills.
- Give formative feedback early on to help students stay on track throughout the completion of the assignment.
<table>
<thead>
<tr>
<th>Possible steps in a complex assignment</th>
<th>Smaller assignments to help students master this step</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic Selection</td>
<td>Free-writing</td>
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<td></td>
<td>Proposal</td>
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<td></td>
<td>Working Thesis Statement</td>
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<tr>
<td>Research</td>
<td>Annotated Bibliography</td>
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<td></td>
<td>Read Map</td>
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<tr>
<td>Evaluation of Sources</td>
<td>Critical Review</td>
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<td></td>
<td>Literature Review</td>
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<tr>
<td>Draft</td>
<td>Outline</td>
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<td></td>
<td>First Draft</td>
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</table>

Process scaffolding has many advantages: it gets students started on their assignments early, giving them more time to think through their ideas and reflect on their writing and research. It allows you or your TA to give feedback early on to make sure students are on track. Finally, because students must submit chunks of an assignment throughout the term, it is much more difficult for them to plagiarize.
HISB03 Critical Writing and Research for Historians: Christine Berkowitz

Number of Students: 25

Learning Objectives:
- Read critically and manage the reading load in an average history course.
- Understand and apply the concepts of historical thinking.
- Analyze historical arguments as well as craft their own.
- Make effective use of the research and writing resources available through the UTSC Library and Writing Centre.
- Conduct basic research using both primary and secondary sources.
- Understand and respond to the requirements of a variety of typical assignments required in a history course.
- Successfully craft a short research paper based on primary and secondary sources.

Critical Book Review of a Supplementary Text Chosen by the Student:
- Précis Writing: Effectively analyze and summarize short readings. Based on assigned short readings examining the uses and abuses of history, students are required to write 1 short précis per week in weeks 2 and 3 of the session.
- Small Group Assignment: Identifying the main components of a scholarly book review. For the duration of the session, students are grouped according to their selection of the supplementary text. An external wiki page is used to facilitate online group discussion around assigned topics.
- Writing Skills Workshop: Crafting a book review (led by a Writing Centre instructor).
• Book Group Presentation: In the final days of preparing a book review, students work together in their book groups to develop an oral presentation (10 minutes in length) on the highlights of their supplementary text.
• Book Review Assignment: 2 to 3 pages based on the selected supplementary reading.

Instructor Comments:
This is a course designed with scaffolding in mind and is therefore intentionally structured as a workshop/seminar format with a cap of 25 students. To employ this approach in other history courses with significantly larger enrolments and where the learning outcomes require the acquisition of knowledge of a particular field/methodology of history is challenging but even with fewer steps is still effective and rewarding.
Method #2: Critical Thinking Scaffolding

Critical thinking scaffolding helps students improve the sophistication of their thinking. While it can be quite difficult to implement in survey courses, it is ideal for courses or assignments that delve into the depths of complex ideas or focus on specific issues.

Critical thinking can be scaffolded in different ways. The most common would be to use different types of assignments to build students’ critical thinking skills throughout the course:

- Begin with simpler assignments that demand lower level cognitive skills (e.g. abstract, description, quiz).
- Develop more complex assignments that demand interpretation, application, or analysis (e.g. case study, book review).
- Then encourage students to evaluate ideas with more comprehensive assignments (e.g. literature review, policy recommendation).

Critical thinking scaffolding allows you to demand more sophisticated analysis from your students and encourages them to move beyond rote memorization or simple comprehension of course material.
# Taxonomy of Critical Thinking Skills
(adapted from Bloom, 1956)

## Higher Order Critical Thinking Skills

<table>
<thead>
<tr>
<th>Skill</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation</td>
<td>• Discriminate between complex ideas; assess the value and significance of theories, concepts or data</td>
</tr>
<tr>
<td>Synthesis</td>
<td>• Bring diverse ideas together into a meaningful whole</td>
</tr>
<tr>
<td>Analysis</td>
<td>• Troubleshoot or solve problems</td>
</tr>
<tr>
<td>Application</td>
<td>• Apply concepts to new situations</td>
</tr>
<tr>
<td>Comprehension</td>
<td>• Understand information and restate it in own words</td>
</tr>
<tr>
<td>Knowledge</td>
<td>• Recall information</td>
</tr>
</tbody>
</table>

## Lower Order Critical Thinking Skills
Examples of Critical Thinking Scaffolding

WSTC16H Criminal Women: Women, Justice and the Media: Nancy Johnston

Number of Students: 55

Learning Objectives:
• Discuss current studies and feminist approaches to intersections of gender, race and class in the study of criminal justice, the prison and justice system, the concept of criminalization, research on women in prison internationally, and global perspectives on the criminalization of women.
• Examine the ways gender functions as a factor in historical and cultural constructions of women and crime, the nature of women and crime, and challenges for criminal justice.
• Develop critical skills for analyzing popular writing and academic articles (case studies, comparative studies, and quantitative and qualitative studies).

Description of Assignment:
Critical thinking skills divided into steps:
• Reading Response: Students respond to assigned questions about course readings.
• Critical Article Review: Students respond critically to an assigned article and discuss how it relates to course concepts and feminist issues.
• Research Proposal: Students choose a topic related to course issues in women’s literacy, women’s reading, or women’s writing and publishing.
• Peer Review: Students receive feedback on their proposals.
• Research Essay: Students complete a research essay incorporating critical feedback.

**Instructor Comments:**
The learning goal [for the first assignment] was to have students apply course terminology and approaches, and to identify the authors’ positions. In the second assignment, students were expected to respond critically to course material. After the critical review, students were more confident in their review of literature needed for the final assignment. Proposals were shared in a peer review session. Students indicated this session allowed them to try out their arguments, to receive suggestions in a non-threatening way, and to narrow their topics.
Method #3: Disciplinary Practice

The aim of this type of scaffolding is induction into disciplinary practice: introducing students to professional discourse and practices of your discipline by modelling the conventions of that discipline. Although this type of scaffolding is ideal for upper-level students who are considering their careers and making decisions about graduate school, it can also be helpful for lower-level students who may need some support in understanding the different expectations and criteria in different disciplines.

To make this type of scaffolding effective:

• Begin with building vocabulary and understanding of foundational concepts.

• Choose assignments that are common in your discipline (book review, case study, lab report).

• Have students complete at least one activity (presentation, formal peer review, lab) at a more professional level.

The main advantage of disciplinary scaffolding is that it explicitly models how to think like a philosopher, biologist, physicist, psychologist, etc., so that students can start to make the terminology and conventions a part of their everyday vocabulary and practice.
Examples of Disciplinary Practice Scaffolding

PSYD66: Current Topics in Human Brain and Behaviour: Janelle Leboutillier

Number of Students: Max 24

Learning Objectives:
• Evaluate content, clarity, coherence, style, and mechanics of review papers.
• Challenge and respond to critical feedback on their final papers.
• Integrate all feedback into a revised version of their paper for subsequent submission to a student journal.

Topics Introducing Students to Publication Process:
• Literature review (which is submitted for peer review).
• Peer review: Following professional standards outlined by the instructor, students review 2 of their classmates’ lit reviews.
• Revision: Students revise their drafts based on the peer feedback they’ve received.
• Submit final draft.

Note that students are marked both on their final drafts as well as the quality of feedback they provided for their peers.

Instructor Comments:
When I first developed this course I wanted to share with students the skills acquired in writing and submitting a manuscript for publication. By providing them with specific examples of the challenges researchers face in publishing their work, they gain a good insight into the process. These skills are transferable to other aspects of life whether these be work or school related.
Method #4: Blended

The different approaches to scaffolding can also be blended in creative ways to encourage your students to develop a range of skills that will support your learning objectives and their success in your course and throughout their careers.

- Be creative! Interesting assignments encourage students to be engaged, and are much more fun to mark.

- Stay focused on specific learning objectives: attempting to accomplish too much may overwhelm students or dilute key learning goals.

Blended scaffolding offers the opportunity to develop a course that is holistic in the way that it prepares students for future studies. The danger is attempting to do too much, which can dilute the instructional supports that scaffolding will offer. This does not mean that you can’t ask a lot from your students; well-implemented scaffolding actually allows you to demand more from students without overwhelming them. It means only that you need to stay focused on the objectives you want to achieve.
Examples of Blended Scaffolding

MATA33 Calculus for Managers II:
R. Grinnell

Number of Students: 550

Learning Objectives:
• Writing a system of equations that models the statement given in words and numbers.
• Master the different ways of solving a system of equations, e.g. matrix method, Cramer’s rule and row reduction.
• Increase students’ appreciation of the power of mathematics to solve a practical problem.

Blending Assignment Process and Critical Thinking:
Imagine you are the buyer for a car rental agency. There are two types of cars to be bought: compact and sedan. Each compact car costs $c and each sedan costs $d, d>c. You have a budget $m and a total n cars is to be purchased:
A) Write the corresponding matrix equation of a system that describes this situation.
B) Find the inverse of the matrix in part A and solve the system.
C) Use method of reduction to solve the system.
D) Use Cramer’s rule to solve the system.
E) Verify your results in B, C, and D satisfy the equation in A.
F) Write a simple inequality in terms of c, d, m, and n that must be true in order for the solutions to be meaningful in the context of this problem.
Instructor Comments:

Students benefit a lot when a mathematical concept can be expanded upon and applied in a real world setting.

The sequencing of exercises in the full problem starts with the mathematical concept, then moves to the question of how this can be shown in a real world problem, and culminates in the engineering, where the act of scaffolding brings all of these together.

This problem has appeared in this course for 5 years, and is truly enjoyed by many students.
Frequently Asked Questions About Scaffolding

The chart below suggests possible solutions to common concerns about scaffolding. However, we recognize that every teaching situation presents its own unique challenges. Please don’t hesitate to contact the Centre for Teaching and Learning if you would like to have a confidential discussion about implementing scaffolding in your course.

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>“What if I’m already overwhelmed and don’t have time?”</td>
<td>Yes, it takes time in design, but it will save time – and most importantly frustration – when grading, particularly for large final assignments. Use technology! Various tools on Blackboard can help speed up marking and administration. Also, the library can set up feeds for your course that will help with research goals. Remember that not every assignment or activity needs to be formal. Small activities such as iClicker questions or one-minute papers can benefit students by encouraging them to reflect on material without demanding too much time in marking or preparation. Build learning communities in class or on Blackboard and have students review each other’s work. They will benefit from both giving and receiving feedback.</td>
</tr>
<tr>
<td>Question</td>
<td>Response</td>
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</tr>
<tr>
<td>“My students don’t like a lot of small assignments. They complain it’s too much work. How should I deal with this?”</td>
<td>Emphasize connections to course learning objectives. Be explicit about the process and value of working step-by-step towards goals. Explain that it isn’t really MORE work, just organized differently.</td>
</tr>
<tr>
<td>“What do I do to make sure this doesn’t take up too much of my (or my TA’s) marking time?”</td>
<td>Give pass/fail grades for smaller, less consequential assignments. Stagger assignments so that not all of them need to be marked at once. Give more feedback early on, when students will benefit most from it, and less later on. Focus feedback on learning objectives. Develop grading rubrics to facilitate marking.</td>
</tr>
<tr>
<td>“I tried grading and giving feedback on early drafts and students just made the specific changes I suggested and expected better marks. How can I change their expectations?”</td>
<td>Make global as well as specific recommendations to ensure students realize that revision isn’t just rearranging a few words and correcting typos. Define revision and discuss process and expectations explicitly—show samples where possible. Tie comments to specific learning objectives. Create a revision rubric with clear criteria for your expectations. Make the final step worth the bulk of the marks.</td>
</tr>
</tbody>
</table>
Assignment Glossary

Memory and Comprehension Checks
Quick ways to ensure students understand the basics before attempting to complete more complex assignments.

iClicker questions:
Great for in-class mini-quizzes. While the technology cannot be used to give grades, iClickers are a fun way to both encourage students to test their own knowledge, as well as to give them a graphic illustration of what their peers are thinking.

Self-Test quiz:
A low-tech version of the above that is much harder to track and grade, but much easier to administer. Simply ask students a series of questions and have them write answers in their notes. Then go over the answers with them, so they can check their own work.

Writing-to-Learn Assignments
These are informal, easy to administer, and very useful for helping students process course material.

Learning journal:
Encourages students to reflect on their learning process throughout the term. Students write regular entries in response to clear prompts related to course material or their understanding of it. Not only does a learning journal help students learn to articulate their thoughts and questions, it helps them to see the progress they’ve made and notice patterns in the course material.
One-minute paper:
A very short essay, usually written in-class without time for planning or revision. Key is to give students a clear question prompt and one minute to jot down their answers.

Read Map:
A concept map that helps students synthesize their research or course readings. Encourage students to draw and label the connections between their sources.

Reflection paper:
A short writing assignment that can be written either in class or at home. Reflection papers are most useful for getting students to step back from the material to think about their own understanding of it (and strategies for moving to the next level) or patterns within it (developing a richer understanding). It is important to give students a clear prompt to help them focus.

Statement of confusion:
A version of the one-minute paper where students are asked to write for a minute or two on the concepts or material that most confuses them. If collected, these statements can be very helpful for seeing whether and where students are getting lost.
Revision Assignments

Revising or re-thinking their work helps students improve their critical thinking skills and course mastery. The following assignment types are effective approaches for large classes.

*Meta-statement:*

Prompt students to write a paragraph reflecting on how they would improve their paper if they had the time or opportunity. This assignment can be effective whether students write it before handing in their papers or after they have received feedback.

*Peer review:*

Peer review can be done in-class, outside of class, or through technology such as Blackboard or PeerScholar. Students will need to be coached on how to give effective feedback (rubrics and models are very helpful for this), and to ensure that all students participate, the exchange of papers should be organized by the instructor or TA.

**Note:** Official university policy states that students cannot grade each other for marks; they can only offer each other feedback or suggestions for revisions. All marks must be assigned by instructors or TAs. When incorporating peer review sessions into your class, either leave the assignment ungraded or grade students based on the quality of their feedback.
Support Services for Instructors and Students

### The Library

**utsc.library.utoronto.ca**

<table>
<thead>
<tr>
<th>For Students</th>
<th>For Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>• One-on-one appointments.</td>
<td>• Research support.</td>
</tr>
<tr>
<td>• Research support online, by phone or by chat.</td>
<td>• In-class workshops.</td>
</tr>
<tr>
<td>• In person at the reference desk.</td>
<td>• Library Resource Tool:</td>
</tr>
<tr>
<td></td>
<td>Class-specific feeds for</td>
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<tr>
<td></td>
<td>Blackboard or intranet pages.</td>
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</table>

### The Writing Centre

**utsc.utoronto.ca/twc**

<table>
<thead>
<tr>
<th>For Students</th>
<th>For Faculty</th>
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</thead>
<tbody>
<tr>
<td>• One-on-one appointments.</td>
<td>• Assignment consultations.</td>
</tr>
<tr>
<td>• Seminars.</td>
<td>• In-class workshops.</td>
</tr>
<tr>
<td>• Handouts on Writing.</td>
<td>• Class-specific Writing Clinics.</td>
</tr>
<tr>
<td>• Writing Clinics.</td>
<td>• Handouts on writing.</td>
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<td>• Drop-in hours.</td>
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## English Language Development
[utsc.utoronto.ca/eld](utsc.utoronto.ca/eld)

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<th>For Faculty</th>
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<tr>
<td>• RWE program.</td>
<td>• Individual consultations.</td>
</tr>
<tr>
<td>• Communication Cafe.</td>
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<tr>
<td>• Vocabulary Cafe.</td>
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## Math and Stats Learning Centre
[utsc.utoronto.ca/mslc](utsc.utoronto.ca/mslc)

<table>
<thead>
<tr>
<th>For Students</th>
<th>For Faculty</th>
</tr>
</thead>
<tbody>
<tr>
<td>• One-on-one appointments.</td>
<td>• Individual consultations.</td>
</tr>
<tr>
<td>• Virtual tutoring.</td>
<td></td>
</tr>
</tbody>
</table>
Bibliography of Resources on Scaffolding

The following is a bibliography of resources related to scaffolding. Visit the Centre for Teaching and Learning for a wide variety of resources on instruction and the scholarship of teaching.


Ludwig-Hardman, S., & Dunlap, J. C. (2003). Learner support services for online students: Scaffolding for success. *International Review of Research in Open and Distance Learning, 4*(1).


