Re-Tooling the Factory: Scaffolding for Library Labs in Large First Year Courses

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Introduction

Large first-year classes are the gateways to advanced courses on nearly every campus. These classes are not ideal for nurturing information literacy (IL). Since textbook-based multiple-choice questions account for a significant percentage of their final grade, students work predominantly at the two lowest cognitive levels of Bloom's Taxonomy. In order to explore ways of enhancing IL and student engagement in large first-year classes, I analyzed *Introduction to Psychology,* PSY100, at the University of Toronto, Mississauga, (UTM), where I am a science liaison librarian. My goal was to identify and exploit existing IL content, and to assess readily available IL scaffolding for its effectiveness in improving IL outcomes, especially where teaching assistants could deliver IL content previously designed by a librarian/course instructor team.

The Challenge of Large First Year Classes

The syllabus of PSY100 is characteristic of many large first-year survey classes. At its core is a grading scheme geared towards textbook learning and multiple-choice test assessment. Every two weeks the students answer a short term test of 30 multiple choice questions each. Six, or half, of these short term tests, cumulatively worth 21% of the final grade, are based on the textbook. The remaining six short term tests, also worth 21% of the final grade, are based on the lectures. Work in a "virtual" psychology lab is worth 25%. The final exam, worth the remaining 33% of the course grade, is composed of 160 multiple choice questions based solely on the textbook. Effectively, 54% of the final mark in the course is derived from answers to multiple-choice questions based on the textbook. In theory, it is possible for a student to pass PSY100 and similarly constructed courses without attending a single lecture or lab.

PSY100 is a true gateway course. Few other courses on campus rival PSY100 in the number of programs of study (POSts) for which it is a pre-requisite – twelve. The impact of this is significant: As PSY100 students populate a variety of programs, they carry with them information-seeking and information use habits they have learned in the gateway course. UTM librarians see the evidence of the PSY100 information literacy dispersion mechanisms both at the reference desk and during pre-instruction surveys. PSY100 information literacy content has an impact on the IL level on the entire undergraduate body. Embedding information literacy into PSY100 is a significant challenge: the course is a vital departure point, yet the learning opportunities it allows belong to the assembly-line model of pedagogy.

Information Literacy and the Lab

Having sketched this picture of PSY100, let me refine our understanding of where library instruction and information literacy fit in. Over the years, PSY100 students were given two simple library assignments, each worth between 0.5 and 1% of their final grade. The liaison librarian was invited for a 15 minute session at the end of a lecture in a 500+ seat lecture theatre. There was no opportunity to develop a rapport with the class. The expected learning outcome of the interaction was students' increased awareness

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of the assignment and the existence of the subject librarian as a resource.

Information science literature on the topic of addressing instruction and information literacy needs of large classes suggests a number of solutions to embedding IL in PSY100 (Fravel Vander Meer, Ring & Perez-Stable, 2007; Larkin & Pines, 2005; Thaxton, Faccioli & Mosby, 2004). One possible solution is designing a stand-alone information literacy assignment which addresses an information need within the course, for example a research assignment. Unfortunately, this approach, as successful as it has been for others (Larking & Pines, 2005), would require a substantial alteration of the course. Another solution is incorporating librarian-designed IL modules alongside existing IL content.

I studied the information literacy content of the PSY100 materials in order to find a natural insertion point for an IL module. The laboratory component of PSY100, through its exploration of the scientific method and data analysis, already incorporates many elements of IL as defined in *Information Literacy Competency Standards for Higher Education* (2000). Specifically, laboratory activities include Standard 1 performance indicators and outcomes such as 1.2.f ("realizes that information may need to be constructed with raw data from primary sources") and Standard 2 performance indicators and outcomes such as 2.5.b ("creates a system for organizing the information"). Thus, I chose to redesign existing library assignments into information literacy labs and make them an integral part of the PSY100 syllabus. Creating an IL PSY Lab became the focal point of the IL evolution in PSY100. Surrounded by labs on data collection or interpretation, the IL labs have a chance to be absorbed into the intellectual discipline of the course and can provide the students with an opportunity to construct a conceptual framework around them. However, the IL labs as I conceived of them needed an instructional component of up to 30 minutes per lab.

At this point, I was left with some considerations: What should be the focus of instruction? Should students work on task-based objectives, as was the case for most of the PSY100 labs, or on a "bigger picture" concept-based exploration of information resources in psychology? Should one assume that once students have constructed a path to the information resources, as in a task-based scenario, they would later create connections between the tools and the contexts of their use? On the other hand, would it be better to show students where information sources and information-finding strategies fit globally, and then let them explore the specific uses? Within a short session, I felt I only had time for one surgical strike. However, it was worth investigating what effect changing the instruction method had on student performance, and what kind of feedback could be obtained from students to make the IL labs, and the accompanying instruction, as rich as possible for the greatest number of students.

Scaffolding in Practice

In order to make it possible to experiment with different modes of scaffolding instruction, I chose the summer session of the PSY100 course – still large enough to need more than one tutorial session, but small enough so that I could teach in every session. The first key change in embedding IL in PSY100 was strategically introducing the redesigned assignment in the lab, not at the end of the lecture. I gave 30 minutes of targeted instruction in two sessions of approximately 60 students each. For the test case, the 2008 summer session, this was feasible. For the full academic year, as it is offered through the fall-winter session, another means of scaffolding would have to be used. Our initial choice was TA-led or lab co-ordinator-led instruction in each of the 25 sessions of approximately 60 students each. Later, I could develop a Web-based tutorial encompassing the best practices from the instruction sessions.

Of course, the assignment itself was redesigned to offer more of a research challenge, and to allow some of the higher levels of Bloom's Taxonomy to be involved. With the new assignment, students could apply, analyze and synthesize information while learning about scholarly literature searching in a journal article database. The instruction session, together with directions and examples attached to the assignment sheet, provided the cognitive scaffolding.

While there are many interesting facets of PSY100 IL re-tooling, the objective of this investigation was to compare two pedagogies of providing scaffolding for the new IL lab. The two different instruction approaches I used were:

- teach the process (**concept-based** pedagogy underlining general principles and skills which could be applied to searching for scholarly sources in many contexts); and
- focus on the tools and outcomes (**tool-based** pedagogy outlining how to complete the assignment without underlining the universality and portability of these skills).

Determining which pedagogy correlated with greater IL gains was important in its own right, but would also affect the teaching strategy to be passed onto the TAs who were to eventually provide assignment scaffolding in the labs.

Baseline Determination

In order to be able to assess any IL gains, the students in both of the lab sessions were given a 10 question IL pre-test. I used the SAILS (Standard Assessment of Information Literacy Skills) instrument for both the pre- and post-test questions. The SAILS instrument was developed at Kent State University as a national benchmarking assessment for information literacy (Project SAILS, 2009). The SAILS questions had been developed during a 3-year research and development effort. They are intended to assess the information literacy competencies of students and to target instruction to the identified needs of students.

The 10 pre-test questions were chosen from

the SAILS search strategies, search tool selection and identification questions. The post-test, also comprising ten SAILS questions, would have been ideally the same as the pre-test. However, because the summer course schedule makes for a very intense course, the lab instructor and I felt that a better test of real learning would be offered by selecting different SAILS questions from the same categories. Thus, the pre-test question set was different from the post-test set in content and order, but not in the types of information sought out.

Students were given the pre-tests before they participated in the 30 minute instruction session. Ten days later, after the completion of their IL assignment, both groups were asked to complete the post-test. Laboratory sessions were scheduled back-to-back in the evening so that students from the first group had no opportunity to physically interact with the second group. Both the lab co-ordinator and I monitored students for IM use and the presence of other electronic communications.

Tutorial Group 1, or the Concept Group, was larger than Tutorial Group 2, or the Task Group. Responses from the Concept Group were collected electronically as anonymous Word files; Responses from the Task Group were collected electronically through Blackboard, the learning management system (LMS) widely adopted at the UTM. Student numbers were stripped out of the raw data files so that only aggregate data could be analyzed. Individual responses could not be tracked through the pre- and post-test process to allow for an in-depth statistical analysis. Thus, data analysis in this investigation is largely qualitative and, when quantitative, it is carried out on aggregated responses. Let us examine the differences in group answers to the pre-test.

Table 1:
Average Responses to Pre-Test Questions for Both Groups

	Pre-Test Lab Group Responses	
	Concept (n=68)	**Task** (n=38)
	% Correct	% Correct
Total Average Score and Standard Error of the Mean (SEM)	36 (17.0)	35 (17.0)
Question Average Scores		
Q2	41	45
Q3	46	45
Q4	3	10
Q5	50	29
Q6	41	29
Q7	29	40
Q8	59	65
Q9	41	42
Q10	12	8

Total average scores for the two groups are within one percent of each other. The standard error of the mean (SEM) figures are quite large for both sets, at 17. Assuming that both sets of responses follow a normal distribution, the standard deviations for each group independently are higher than the inter-group difference. Thus, the two average scores may be considered equal. Before instruction, both groups answered approximately 35% of the IL pre-test correctly.

Data Analysis

There were two sets of post-test data from the two tutorial groups:

- **Concept-oriented:** 45 out of 68 students participated.
- **Task-oriented:** 31 out of 38 students participated.

Although the results could only be analyzed as aggregate data, without the ability to follow an individual's progress, the total average scores were higher for both groups after IL scaffolding and assignment completion. Both groups improved their IL scores after the IL tutorials. The Concept Group almost doubled its score, in fact. However, even though there appears to be a marked difference between the Concept and the Task group performance following IL instruction, the very high standard error of the mean (SEM) values negate the statistical significance of this inter-group difference. Because of the large error in both sets of data, one cannot claim that the apparent inter-group difference of 12 percentage points is statistically significant. The SEM errors are greater than the inter-group difference. There is a statistically significant result, however: the post-IL instruction results show a statistically significant improvement in IL score for the Concept Group.

Conclusions and Future Work

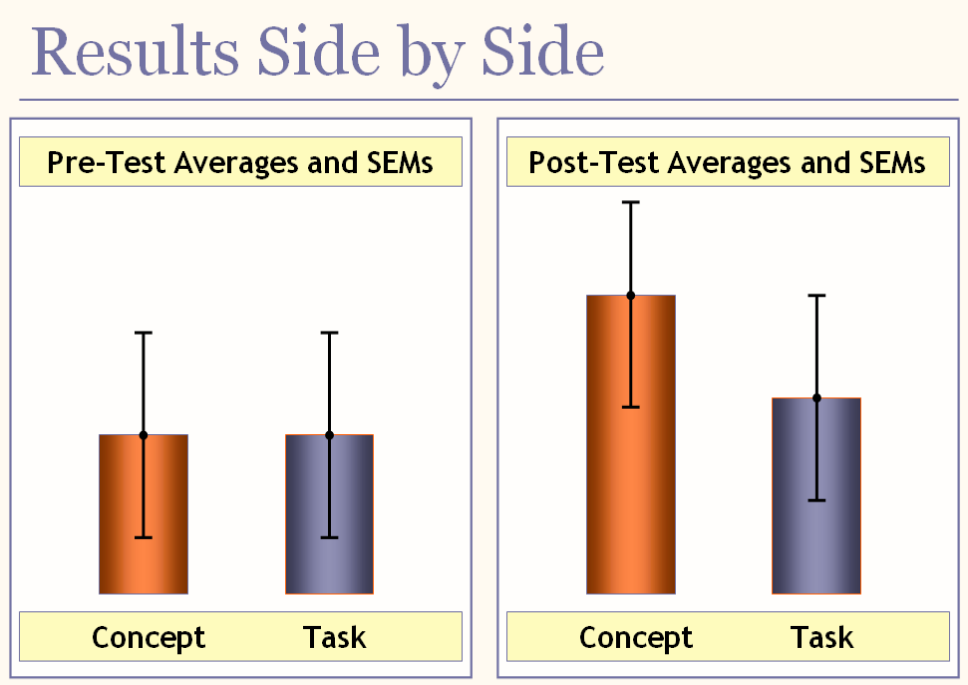
Which instruction method will work best for a given student is an individual matter. It depends on the instructor's facility and experience, and on each student's learning style, perception, and a host of other factors. However, overall group response to an information literacy scaffolding pedagogy can be measured by observing the group's aggregate score to a standardized IL assessment instrument. I have observed an increase in the average post-test response of a student group which received Concept-based information literacy instruction vs. a peer group which received Task-based instruction. Because small populations and a single trial were involved, the standard error of the mean was quite high. My result, although promising, is not statistically significant for inter-method instructional difference. The difference in the before and after instruction for the Concept group, however, is statistically significant.

As an instructor, I sensed a conflict between using the approach that had long-term strategic objectives (Concept-based pedagogy) but seemed to leave more students feeling confused during the session, as opposed to the short-term goal approach (Task-based pedagogy) which seemed to temporarily satisfy the students by giving them "the answers." Apparently, students who were taught to look at the big picture gained more from completing the assignment than their peers, even though they started from a position of greater discomfort and uncertainty. Seeing that the

Table 2:
Average Responses to Post-Test Questions for Both Groups

	Post-Test Lab Group Responses	
	Concept (n=45)	**Task** (n=31)
	%	%
Total Average Score And Standard Error of the Mean (SEM)	60 (18.7)	48 (21.7)
Question Average Scores		
Q1	27	10
Q2	62	74
Q3	58	61
Q4	49	29
Q5	91	74
Q6	42	42
Q7	73	61
Q8	56	58
Q9	33	23

Figure 1:
Graphical Comparison of IL Scores for the Concept and Task Groups before and after IL Scaffolding and Instruction.



Concept-based approach has the potential to correlate with an enhanced IL outcome given further tests, I may be able to show to my future students that giving them the answers is not the pedagogically sound approach.

I will continue working towards assessing PSY100 library lab content and scaffolding in relation to student information literacy gain. Part of my work will involve reaching students through other pedagogies and through online media. Encapsulating the concept-based approach for TA training will be my priority, thus allowing me to graft some flexibility and engagement onto assembly line learning.

Bibilography

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