The Challenges of Integrating Data Literacy into the Curriculum in an Undergraduate Institution

by Karen Hunt [1]

Introduction

The University of Winnipeg Information Literacy program operates on the premise that students develop information literacy skills and knowledge best when opportunities for learning are integrated into the subject curriculum. This paper discusses the results of attempting to integrate data literacy into the subject curriculum in the same way. While discovering what are the best practices for developing data literacy, the paper considers what aspects can be applied from the information literacy field. And, What is unique to learning how to discover, manipulate and interpret numeric data?[2]

In the last two days I've spent several hours helping students doing a geography assignment that I helped create. As a librarian in a small undergraduate library I also take my turn covering our chat virtual reference service. The chat conversation this evening starts with "I'm hoping this is Karen working" and ends with "what time are you here till tonight". As the assignment deadline approaches another student emails me her spreadsheet to help diagnose a problem. And, yes I can meet with you tomorrow afternoon.
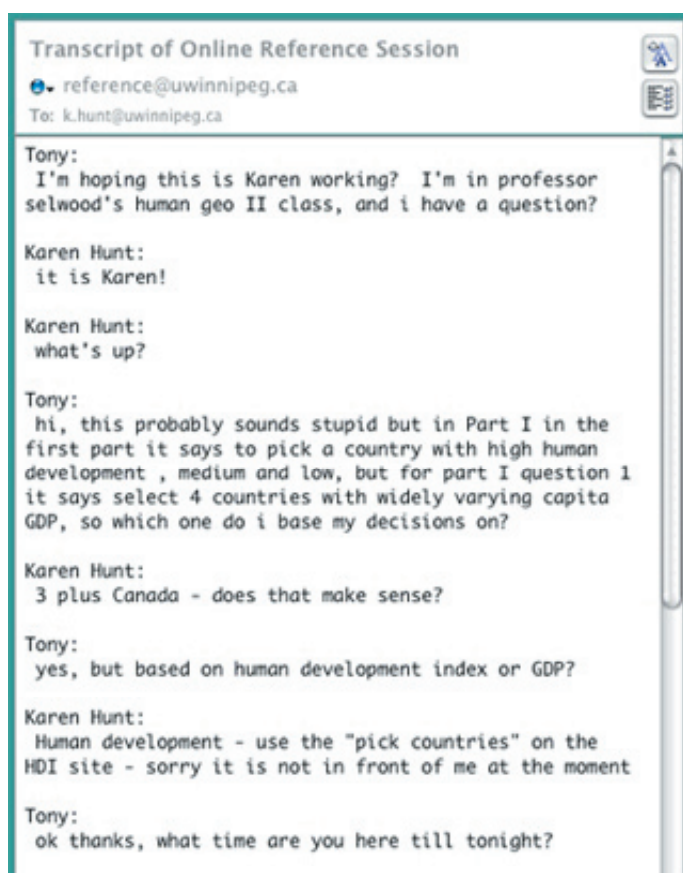

Transcript of Online Reference Session
reference@uwinnipeg.ca
To: k.hunt@uwinnipeg.ca

Tony:
 I'm hoping this is Karen working? I'm in professor selwood's human geo II class, and i have a question?

Karen Hunt:
 it is Karen!

Karen Hunt:
 what's up?

Tony:
 hi, this probably sounds stupid but in Part I in the first part it says to pick a country with high human development , medium and low, but for part I question 1 it says select 4 countries with widely varying capita GDP, so which one do i base my decisions on?

Karen Hunt:
 3 plus Canada - does that make sense?

Tony:
 yes, but based on human development index or GDP?

Karen Hunt:
 Human development - use the "pick countries" on the HDI site - sorry it is not in front of me at the moment

Tony:
 ok thanks, what time are you here till tonight?

Figure 1 Transcript of chat virtual reference session with student working on a Geography assignmen

University of Winnipeg Information Literacy Meets Data Literacy
One of the advantages of being a librarian in a smaller undergraduate library (University of Winnipeg has about 8000 students and seven librarians) is that by necessity I wear multiple hats. My main position is coordinator of the Information Literacy program, but I am also the designated "data librarian." With an undergraduate background in geography and quantitative methods it is relatively easy to work with a faculty member in the Geography department to include finding and manipulating numeric data in a first-year course.

Integrated Information Literacy
The field of information literacy is becoming well established and there is general agreement that students learn best when information literacy is integrated throughout the curriculum.[3] When discussing information literacy with faculty and administration it is helpful to refer to established definitions, reports, research and best practices. These include the Information Literacy Competency Standards for Higher Education (endorsed by the Association of College and Research Libraries (ACRL) in 2000) and Characteristics of Programs of Information Literacy that Illustrate Best Practices: A Guideline also published by ACRL.[4]

There is some tension in the field between stand-alone courses in information literacy and a more integrated approach. My colleagues in Australia also talk of "embedded" information literacy, which they argue is a better approach than "integrated" information literacy.[5] There is also a tension between the service role of a librarian and the teaching role of a librarian-teacher. There is also a tension between recognizing that librarians do not "own" information literacy and the need to find a "home" for information literacy.

All this is interesting to me because I see similar discussions occurring in the field of "data literacy". For example, according to the ACRL best practices document, the goals and objectives of information literacy programs should:

- articulate the integration of information literacy across the curriculum;
- accommodate student growth in skills and understanding throughout the college years;
- apply to all learners, regardless of delivery system or location;
- reflect the desired outcomes of preparing students for their academic pursuits and for effective lifelong learning.

Substitute "data literacy" for "information literacy" and are we on the way to defining the best practices for data literacy programs? It is also interesting to note that the Writing Across the Curriculum (WAC) movement discusses similar issues.[6]

Human Geography Case Study
When the instructor for the Human Geography course and I first discussed collaboration, he was interested in a term assignment that would get students "into the data," that was scalable to a large class, and was easy to mark. Briefly, the assignment involves the students using the United Nations Human Development Indicators, constructing their own HDI for provinces and a territory in Canada, and constructing their own population pyramids for two small towns in Canada.[7] The assignment includes finding and retrieving data, manipulating data using MSExcel and understanding how indexes are created. Students must also demonstrate an understanding of the relationship between quality of life, population age distributions and migration, and how these factors are distributed geographically.

Librarian's Involvement	Instructor's Involvement
- Developed the assignment, initially for a small class (Fall 2003) - Held labs for the class - Available for tutoring and questions	- Created the shape of the assignment - Fielded questions from students - Lectures on development and population distribution - Ultimately responsible

Table 1: Roles in the Human Geography Term Assignment

There are several things I have learned from our collaboration, which roughly fall into two categories: how this collaboration is the same as other more traditional information literacy assignments and how it is very different!

Data Literacy Same As Information Literacy
Finding the best methods for ensuring students learn is the same whether we're discussing information literacy, writing across the curriculum or data literacy (at the 20000 foot level at least). Students learn best when the curriculum is relevant and builds on previously learned skills and knowledge, involves opportunities for making connections and practicing, and includes appropriate scaffolds. Proponents of data literacy should borrow heavily from information literacy and learning theory.

Data Literacy Different Than Information Literacy
In the practical implementation (or on the ground) data literacy is quite different than traditional information literacy.

Toolbox for numbers is more complicated
In a typical course-integrated approach to information literacy I can assume the students know how to read, use a web browser and word processor. At this time I can't assume that students know how to use a spreadsheet or even remember that one can turn a positive number into a negative number by multiplying by negative one. This assignment didn't even require the use of any statistical package.

Developing and supporting assignments takes more time and expertise
If I develop an assignment that requires English students to compare the process of finding a journal article to finding a book, I can assume my colleagues can also help students with the assignment. Until the training of reference librarians includes more "data literacy," supporting data assignments will be onerous for those that *can* provide help. Staff training will be critical to make a "data literacy across the curriculum" program scalable. It also seems to be more complicated to develop data assignments, however that may reflect my own lack of practice in this area. As chat transcript (Figure 1) demonstrates, support for this assignment relied on one person.

Recommendations
Terminology and Definition
The information literacy field may not agree on the precise definition of information literacy, but most people use the term "information literacy" rather than "library instruction" or "information fluency." In what I have been calling "data literacy" we have statistical literacy, quantitative reasoning or quantitative literacy, numeracy and data literacy all roughly meaning the same thing. [8] Until we start talking the same language amongst ourselves it will be difficult to convince our stakeholders that we should be revising curriculum and programs.

Articulated Learning Outcomes and Best Practices
In information literacy we have the ACRL Competency Standards (and similar documents in Australia and elsewhere). The data literacy field is more fragmented. For example, those discussing "quantitative literacy" and "statistical literacy" often leave out the finding and evaluating of existing statistics and data.

In my own view, what needs to be done is:

- get the players talking to each other;
- decide on one term and agree upon a definition of "it";
- codify data literacy learning outcomes;
- endorse and promote the standards;
- develop opportunities for data librarians to learn how to integrate the outcomes;
- articulate best practices for data literacy programs.

Training
The success of data literacy will depend on how well we train data librarians about teaching; reference librarians and support staff about data and referrals; and faculty and administrators about why data literacy is imperative.

Conclusion: Finding a Home for Data Literacy

The success of the information literacy programs is due, in part, to the library organizations and librarians who have taken a leadership role. The success of data literacy may also depend on organizations such as IASSIST providing leadership and finding or creating a home for data literacy, while always considering the real success will be measured in the strength of the relationships among all partners and the depth of our students' understanding.

Notes

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[2] This paper is a rough translation of one delivered at the 2004 IASSIST Conference in Madison, Wisconsin. The online version, complete with references and links, can be found at http://scholar.uwinnipeg.ca/khunt/iassist2004/

[3] See for example, Rockman, Ilene F. (2004). *Integrating information literacy into the higher education curriculum : practical models for transformation*.1st ed. San Francisco: Jossey-Bass.

[4] American Library Association (2004) *Information Literacy Competency Standards for Higher Education*. Available at: http://www.ala.org/ala/acrl/acrlstandards/informationliteracycompetency.htm; American Library Association (2004), *Characteristics of Programs of Information Literacy that Illustrate Best Practices: A Guideline*. Available at: http://www. ala.org/ala/acrl/acrlstandards/characteristics.htm

[5] Bundy, A (2004) (Ed.). *Australian and New Zealand Information ~~Litercay~~ Literacy Framework: principles, standards and practice* (2nd ed.). Adelaide: Australian and New Zealand Institute for Information Literacy. Available at: http://www.anziil. org/resources/Info%20lit%202nd%20edition.pdf

[6] See http://mendota.english.wisc.edu/~WAC/

[7] United Nations Human Development Indicators. See http://hdr.undp.org/statistics/data/

[8] See for example Schield, Milo (2004). *Statistical Literacy and Liberal Education at Augsburg College*. Peer Review Summer Issue, Assoc. of American Colleges and Universities. Available at: http://www.augsburg.edu/ppages/~schield/.