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Review of *Developing Quantitative Literacy Skills in History and the Social Sciences: A Web-Based Common Core Approach* by Kathleen W. Craver

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Review of *Developing Quantitative Literacy Skills in History and the Social Sciences: A Web-Based Common Core Approach* by Kathleen W. Craver

Abstract

Kathleen W. Craver. *Developing Quantitative Literacy Skills in History and Social Sciences: A Web-Based Common Core Standards Approach* (Lanham MD: Rowman & Littlefield Publishing Group, Inc., 2014). 191 pp.
ISBN 978-1-4758-1050-9 (cloth); ISBN ...-1051-6 (pbk); ISBN...-1052-3 (electronic).

This book could be a breakthrough for teachers in the trenches who are interested in or need to know about quantitative literacy (QL). It is a resource providing 85 topical pieces, averaging 1.5 pages, in which a featured Web site is presented, described, and accompanied by 2-4 critical-thinking questions purposefully drawing on data from the Web site. The featured Web sites range from primary documents (e.g., *All about California and the Inducements to Settle There*, 1870) to modern databases (e.g., city-data.com). The 85 pieces are organized under three headings (Social Science Sites; U.S. History Sites; World History Sites) following three chapters introducing QL, quantitative sources, and communicating with data. The QL skills in the questions are the usual suspects such as making comparisons, graph reading, table reading, and calculating and thinking about ratios. The author, the Head Librarian at the National Cathedral School (Washington DC), clearly aims the book at high school teachers who wish to comply with the Common Core Standards, which call for making communication with data a part of English Language Arts. The authors of this review believe the book will be of great value for college-level teachers too, whether they be interested in finding context (e.g., history and social science topics) for their QL-math courses, or adding QL-type questions to their in-discipline courses. Moreover, we fervently wish that this book will inspire others to create and compile similar resources in such a way that, in the future, there will be a vast *open-access* library of such collections of QL questions coupled to data sources – with updated links – available on the Internet.

Keywords

Common Core Standards, Quantitative Literacy, English Language Arts Standards

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Cover Page Footnote

Victor J. Ricchezza is a first-year doctoral student at the University of South Florida School of Geosciences in Tampa, studying geology. He has experience as a field geologist and a high school science teacher in both standard and virtual settings. He was Subject Matter Expert for development of content and web resources for the geology course for the Georgia Virtual School. His research interests include the intersection of quantitative literacy and geoscience education research, working with undergraduate populations to improve educational outcomes and produce more quantitatively literate geology graduates.

Len Vacher is a professor of geology in the USF School of Geosciences and a co-editor of this journal.

Introduction

Good things come from libraries. An example obvious to these reviewers is *Numeracy*, which is hosted by the Scholar Commons at the University of South Florida (USF) Library. Another is the book under review, *Developing Quantitative Literacy Skills in History and the Social Sciences: A Web-Based Common Core Standards Approach*. This gift to the quantitative literacy (QL) community is a reference book by Kathleen W. Craver. Dr. Craver is Head Librarian at the renowned National Cathedral School (NCS)¹ at Mount Saint Alban in Washington, D.C. Her and her library's entry into the literature of QL resources is a noteworthy event that the QL community should celebrate.

Dr. Craver is an important author. The USF Library, for example, provides access to seven books (Craver 1986a, 1994, 1997, 1999, 2002, 2008, 2014) – with e-book versions – and some of her journal articles (e.g., Craver 1987, 1998; interesting titles omitted include Craver 1986b, 1989, 1991, 1995). These cited references show an obvious theme: critical thinking conjoined with electronic resources in cyber libraries. The package is completely understandable given her setting: a remarkable school in the nation's capital, containing an appropriately remarkable academic library,² containing an appropriately remarkable set of electronic resources and databases, including an award-winning Web Library of its own.³

The resource Dr. Craver has produced for QL is completely consistent with her theme. The book is a Web-based reference and guide for high school history and social science teachers who seek to incorporate QL and quantitative data sources into their curriculum and instruction, but do not know where to begin. The idea – as the title states – is to help these teachers comply with the History/Social Sciences, English Language Arts Common Core State Standards (CCSS) for Grades 9-10⁴ and 11-12.⁵

¹ <http://www.ncs.cathedral.org/podium/default.aspx?t=128427> (This and the other links in this paper were last accessed June 29, 2015.)

² <http://www.ncs.cathedral.org/podium/default.aspx?t=112671>

³ <http://207.188.212.10/>

⁴ <http://www.corestandards.org/ELA-Literacy/RH/9-10/7/>, which says “Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text.”

⁵ <http://www.corestandards.org/ELA-Literacy/RH/11-12/7/>, which says “Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.”

Book Overview

The book is subdivided primarily into two major parts; the first part discusses the educational situation that the book is intended to address, and the second part consists of a series of individually packaged Web resources organized by major subject heading. It is obvious that the book is intended for use by high school history and social science teachers. As we discuss later in the review, this book provides far wider applications and opportunities that are available to the QL community because of this book.

Part One

The first part of the book is divided into an introduction, a chapter on using quantitative sources, and a chapter on interpretation, display, and visualization of data. The introduction correctly discusses one major reason why high school history courses are so light on numerical data: they depend on textbooks, which in turn depend on fitting hundreds or thousands of years of recorded information into a portable volume. Such cramming and cutting is a relic of the pre-digital age, and it does not comport with a digital classroom (or one which can be made digital) that has access to a seemingly infinite storehouse of quantitative data. Dr. Craver gives a primer on how to access and use such expanded sources of data.

The chapter regarding quantitative sources is of particular note to this journal, as it discusses the fact that QL is not particularly well addressed historically in secondary education standards, points out discrepancies in expert definitions of QL, and gives a strong list of criteria for someone to be considered quantitatively literate. There is a discussion of past QL research, including why QL is so sorely lacking in the secondary school curriculum (especially in the social sciences), and a discussion of the appropriateness and applicability of QL to such curricula. Quantitative sources are described and classified, and caveats regarding the sources of data are also introduced. The remainder of the chapter involves practical advice for lesson and unit planning designed to introduce QL-themed activities for classroom teachers.

The final chapter in the first part of the book discusses how data are presented in the social sciences, and it encourages the evaluation of such presentation methods for each individual project or presentation (e.g., tables, graphs, pie charts). Various modern animations and types of graphical representations are also discussed.

Part Two

The second part of the book, consisting of 128 of the 180 pages before the References, is the main part of the book. There are three chapters in this part. Each chapter is devoted to a single broad subject: chapter 3 is social science sites;

chapter 4 is U.S. history sites; and chapter 5 is world history sites. Each chapter goes through a number of topical titles (25, 31, and 29, respectively), each title referring to one principal Web site. With 85 such titles in 128 pages, each such resource is presented in about 1.5 page of text, on average. The information is presented in five steps as follows.

- Resource title (according to which the topics are ordered alphabetically)
- URL of the principal Web site
- Site summary – a paragraph or two on the nature and use of the resource to be found at principal Web site
- Critical thinking questions and activities – specific QL-oriented questions and activities based on the resource, requiring specific details and careful and critical thought
- Related Web sites – gives a few similar sites (URLs) with one-sentence descriptions

In our opinion, the set of site-referenced critical thinking questions and activities is what makes this book such an exceptional resource. As an example, consider question 2 (of four) of the 1.1-page topic, “Gun-for-Slaves: The Eighteenth Century British Slave Trade in Africa” (p. 153–154). The topic refers to a PDF site⁶ containing a 34-page paper of the same title. According to the second paragraph of the book’s site summary,

This article, by University of Michigan Professor Warren C. Whatley, cites primary quantitative data to demonstrate the relationship between the slave trade and gunpowder and arms exports. History and social science students need to remember that data were obtained from British historical sources and that data collecting ceased in 1807 when Great Britain officially abolished the importation, sale and transportation of slaves.

Question 2 asks,

Scroll to page 29 and note the graph titled “Figure 6. Prices of Enslaved Africans on the West Coast of Africa.” Explain why the prices for slaves were rising when Great Britain and the United States had abolished the slave trade.

The question is complex, and, in addition to requiring the quantitative skill of graph reading, it asks that the information be integrated with knowledge of factors related to global economics and history.

The level or rigor of this example is reasonably representative of the questions throughout the book. As noted in the first paragraph of the preface,

The quantitative information and accompanying questions are designed to require no mathematical skills beyond eighth grade.

It’s all basic QL: making comparisons, reading graphs, reading tables, calculating and thinking about ratios.

⁶ <http://www-siepr.stanford.edu/Whatley.pdf>

Sampling of sites by topic. To give a flavor of the range of topics offered in the book's collection of sites, we list some titles grouped by chapter.

- Social Science (from 25 in the chapter):
 - “Cost of War Calculator” (p. 60–61): provides a calculator algorithm that computes the incidental cost from military actions including such things as destroyed homes and lost meals.
 - “Accidental Discharges of Oil” (p. 51–52): database provides information on the largest petroleum spills since 1984, allowing for comparisons and projections.
 - “Terrorism” (p. 80–82): Rand Corporation database of domestic and international incidents of terrorism from 1968 to 2009, with more than 36,000 incidents searchable by multiple criteria.
 - “WomenWatch” (p. 84–85): UN database on progress of women worldwide toward equal status with men.
 - “Literacy Rates of the World” (p. 71–72): map-based site of world's literacy rates with access to other country-by-country statistics.
- U.S. History (from 31):
 - “Coal Mining in the Gilded Age and Progressive Era” (p. 97–98): database of quantity and scope of coal mining through Eastern US in 19th Century, with labor statistics. (This one was a favorite of the reviewers, who are geologists.)
 - “The Salem Witchcraft Site” (p. 122–123): provides Excel spreadsheets on information on those accused and punished for witchcraft in Salem, Massachusetts in 1692 and 1693.
 - “1929 Stock Market Crash” (p. 118–119): provides detailed financial stock data from “Black Tuesday” stock market crash.
 - “The 1911 Triangle Shirtwaist Factory Fire” (p. 128–129): database of information including original documents on industrial fire in New York garment factory that killed 146 and led to significant labor law reforms.
 - “The Domestic Slave Trade” (p. 101–102): economic database with original documents on domestic trade of slaves in U.S. between 1807 abolition of slave importation and 1861 outbreak of Civil War.
- World history sites (from 29):
 - “African Activist Archive” (p. 137–138): database of information, housed at the Michigan State University library, on South Africa's history from Dutch and English colonial periods through apartheid, with searchable multimedia collection of original documents and videos.

- “The Chiquita Papers” (p. 146–147): includes access to an archive of over 5,500 NSA files from the U.S. Justice Department on Chiquita Brands International, uncovering the use of illegal accounting practices to funnel money to a Government-designated terrorist organization in exchange for freedom to conduct business in the area.
- “The Chernobyl Catastrophe–Consequences on Human Health” (p. 145–146): Greenpeace-maintained database of information on health effects in the area around 1986 nuclear disaster site in Ukraine.
- “Statistical Materials for Learning about Japan” (p. 169–171): state-run site (comes up in visually stunning Japanese at first) with official statistics on history, population, economics, and geography.
- “The Nanking Massacre Project” (p. 162–164): statistical database on the war crimes and atrocities from the Japanese invasion of Nanking in 1937 that left over 300,000 Chinese dead.

Classification of sites by source. The following is a rough breakdown of the primary sites listed in the book by source (i.e., the URL of the principal Web site, not the related sites). For 40 of the 85 listed principal sites, multiple categories were appropriate (which is why the counts don’t add up to 85).

- Library sites: 41 (almost all were also university or government)
- University sites: 30
- Government sites: 23 (includes international, but not universities)
- Non-Government organization sites: 17
- Professional media sites: 9 (e.g., *New York Times*)
- Other: 8 (e.g., personal websites)

It is noteworthy that nearly half of the principal Web sites are from libraries.

Discussion

The Medium

Without question, this book provides a much needed resource for its target audience, high school history and social science teachers, whose main attraction to the book will be fulfilling the requirements of the CCSS. The first author of this review – having spent five years as a high school science teacher – is conversant with the pressures, demands, and needs of a high school teacher. This book is just the sort of resource that many teachers out there are desperate to have. Teachers are under constant pressure to improve student outcomes (including in ways beyond their own training, such as QL for many history teachers), and anything making this endeavor simpler or more effective will be welcomed. We, therefore, are inclined to argue in favor of each high school making available at least one copy of this excellent reference as a shared resource for its teachers.

The book we reviewed, however, was a print copy, and we promptly got a lesson on the incongruity of using a print book to provide a collection of Web-based resources. In most cases, the URLs were not short and, with the required extensive typing, they were easy to enter incorrectly.⁷ Nevertheless, we persevered. When we checked the root site for each principal Web site (for classification purposes), we found that the root sites for three⁸ of the 85 sites had expired site licenses and did not function at all; it should be noted that the rate of full links that did not work as typed was significantly higher than 3/85. Obviously, the print book was not updating itself.

To be sure, the book attempts to address the issue of outdated links by giving advice, generally involving either going to the root site and searching there, or running some sort of Web search for the topic or page; it also provides secondary websites. Such workarounds, however, miss a serious point: high school teachers are very busy people under a great deal of pressure. They would be delighted to use a resource like this, provided that it *works*. If the individual resources they select do not work, and the solution is to put the troubleshooting on the teacher's shoulders, teachers are eventually going to stop using the reference, and that's a missed opportunity.

Fortunately for us, the USF Library has the electronic version of the book, available as ePUB or PDF files. The EBL Reader provided by the library (for the ePUB file) allows the user to scroll through the book easily, but the URLs are not linked. One can get to the links by downloading the file and opening it in a separate reader program, but it is a bit of chore. In principle, the publisher can update the outdated links with an e-book more easily than a print book, but our e-book had several dead links.⁹

It would appear that for the resource provided by this book to have maximum usefulness, it would need to be paralleled by a maintained Web site with 85 Web pages consisting of the material in pages 51–179.

Towards a Database of Quantitative Databases

We believe the audience for this book is far larger than the target audience. We believe the entire QL community could benefit from this collection that connects QL-type questions to Web sites containing quantitative information.

⁷ URL shortening, such as with Bitly or TinyURL, would have avoided this problem.

⁸ “The San Francisco Earthquake and Fire of 1906” resource was one of the three topics where the principal Web site was not available – not a good thing to happen to geologist-reviewers. Additionally, the sites for the Bosnian Civil War and for Zipskinny were not functional. In each case the dead end appeared to be due to site non-renewal.

⁹ Including the one to the principal Web site for “The San Francisco Earthquake and Fire of 1906” resource.

Perusing articles in this journal, it can be seen that QL education at the college level includes at least three types of situations in which QL educators could find use for the resource developed by Dr. Craver:

- In QL or other math or statistics courses where teachers may be looking for data in context (under the heading of social studies and history, in this case) to facilitate the teaching of the math (or QL) content. Papers relating to such courses include Watson (2011), Henrich and Lee (2011), Wismath and Worrall (2015), and, in this issue, Todd and Wagaman (2015) and Tunstall and Bossé (2015). In particular, the paper by Catalano (2010), “College algebra in context: A project incorporating social issues” is an obvious example.
- In QL-across-the-curriculum programs, in which QL is integrated into courses within the disciplines, and in the discipline-focused courses themselves, where the instructors’ objective is to teach the context and not primarily the math content. Steele and Kiliç-Bahi (2008), Bressoud (2009), and Frith (2012) speak to across-the-curriculum programs. Sweet et al. (2008) discuss an example of courses specifically in sociology and communication using quantitative data retrieved from databases to stimulate student interests in class discussion, advance analytic skills, and develop capacities in written and verbal communication.
- In courses aimed at developing students’ abilities to write or argue with quantitative data, including those that focus on articles in the media. The QuIRK project at Carleton is a well-represented example of the writing-based approach (e.g., Grawe and Rutz 2009, Grawe 2013), and Quantitative Reasoning in the Contemporary World (e.g., Dingman and Madison 2010, Boersma and Klyve 2013) exemplifies the media-based approach.

With this wide assortment of potential users of the material in part 2 of this book, we are drawn to think again of the value of having this resource available in the form of a Web site.

In fact, given *Numeracy* and a library that champions the concept of open-access publishing (e.g., Chavez 2010), it is pleasing to think that, in the future, resources like this one created by Dr. Craver would be available as *open-access* Web sites. Thinking further, what if they were organized into a collection of such Web sites, ranging across the disciplines and each coupling interesting QL-type questions to primary sources that provide tables and figures with quantitative data? Imagine how rich our QL courses could become.

Who would organize such a gateway database for databases with coupled QL questions? We envision the QL community working with their academic libraries. After all, in the context of QL being “everybody’s orphan” (Madison 2001), it is the academic libraries that are positioned to do the adoption collectively. The academic libraries are in a neutral position amongst courses and curricula. They support all disciplines. They serve all students.

Conclusions

Dr. Craver's *Developing Quantitative Literacy Skills in History and the Social Sciences* was a joy to review. Dr. Craver is to be congratulated for producing such an interesting and promising collection of Web resources that provide data for teaching QL. The coupling of critical thinking QL questions to specific Web sites is an outstanding innovation. To the extent that the collection and approach provide a window to the potential for an open-access, transdisciplinary Web library of similarly conceived collections, the book could be ground-breaking in the on-going advancement of the development of QL resources.

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