

UC Berkeley

UC Berkeley Previously Published Works

Title

Information schools: A Monk, Library Science, and the Information Age.

Permalink

<https://escholarship.org/uc/item/33g728qk>

ISBN

9783110929225

Author

Buckland, Michael

Publication Date

2005

Copyright Information

This work is made available under the terms of a Creative Commons Attribution-NonCommercial-NoDerivatives License, available at <https://creativecommons.org/licenses/by-nc-nd/4.0/>

Peer reviewed

Manuscript for Humboldt University students' book project: *Bibliothekswissenschaft – quo vadis? = Library Science – Quo vadis?* ed. by Petra Hauke. Munich: K. G. Saur, 2005, pp19-32. Revised, June 12, 2005. Differs slightly from published version.

INFORMATION SCHOOLS: A MONK, LIBRARY SCIENCE, AND THE INFORMATION AGE

Michael Buckland

ABSTRACT

Society is being transformed into an “information society.” Universities were effective in the nineteenth century in responding to important societal needs by developing new departments expected to add knowledge through research, to prepare specialists, to assist industry, and to contribute to general education. Modern universities have, however, been slow to respond programmatically to the challenge of the transition to an information society. New academic programs – “information schools” – are now emerging, many, not all, evolved from programs in library science. The relevance of library science as a foundation for information schools is reviewed.

INTRODUCTION

Information is now one of the world's most important and rapidly changing resources. The emerging information society is defined by the rapid creation, dissemination, and manipulation of digital data, and ever more powerful machines and software to originate, manipulate, communicate, and utilize these data of every kind and for every purpose.

The issue now is often less the availability of information than its overabundance, and providing access to quality information for diverse users and uses. The challenge is to filter what is most useful out of the vast quantity of information available: to select, evaluate, describe, store, retrieve, manipulate, and present information in all its forms, including text, still and moving images, sound, and numeric data. The goal is to provide not simply data but information that increases knowledge and enhances understanding.

Documents – we use “documents” as general term for data, records, images, and other genres – are of enormous and increasing social significance because they influence what we know and how we feel. Documents are used to persuade us what to buy and how to live. Teachers use them to educate us. Religions and politicians use documents to persuade us. Artists and entertainers use documents to provoke and to amuse us. Governments use them to control us. The modern economy depends on documenting transactions. Our ability to use documents effectively shapes our world. If even a small percentage of the claims about a “global village” and of an “information age” are valid, they have major social consequences and deserve concerted attention.

The modern university is rooted in the reform and expansion of the German universities under the guidance of Wilhelm von Humboldt and others in the nineteenth century. The distinctively German design included academic freedom, an expectation of research, government funding, assistance for industry, and benefit to society. As a result Germany had the world's greatest universities until

devastated by the First World War, the Depression, and fascist ideology.

Universities have become large-scale agencies of mass higher education. Their complexity and multiple constituencies make planning difficult. Academics tend to be ambivalent about planning, but it would be hypocritical not to remember that today's respectable, traditional academic disciplines were, to a significant extent, shaped and funded for societal needs of the modern nation state of the nineteenth century: history, language, and literature to promote national identity; economics and statistics for industrial innovation and social planning; civil engineering and chemistry for transportation and industrial development; and so on. How, now, should a university respond to the social, corporate and governmental need to adapt to the information age?

INFORMATION SCHOOLS

Industry, government, and universities have all invested massively in the development and adoption of information *technology*. But academic attention to the profound economic, political, and social consequences (and the methods by which individuals and organizations could cope more effectively in this information-saturated environment) has been scattered, limited, and unsystematic until, during the 1990s, a number of programs emerged – information schools – intended to address these issues in a broad and integrated way. At Berkeley the defining document stated¹:

We propose a program that will advance, through teaching and research, the organization, management and use of information and information technology, and enhance our understanding of the impact of information on individuals, institutions, and society. This mission has both a technical component, concerned with the design and use of information systems and services, and a social sciences component, concerned with understanding how people seek, obtain, evaluate, use, and categorize information. The proposed program will use the approaches of several social sciences and professional and technical disciplines to address a core set of information-related issues.

The research mission of an Information School is to explore the design and operation of information systems and services, the nature and properties of information, and information-related behavior at the individual, group, and societal levels.

The primary educational mission of the program is to prepare professionals for corporations, government agencies, and the academic world, who can develop improved approaches to handle information, to design and manage information functions, and to merge them with other aspects of the organization. Evidence strongly suggests the existence of a very large demand for such professionals in business, government, and the academic world.

There is also a “liberal arts” aspect, educational in some purer sense. To use a German word, an element of *Bildung*, of culture and enlightenment, is expected. One can no longer be a

¹This section and the next draws directly on the University of California, Berkeley, Information Planning Group report 1993.

well-educated person in the modern world without some insights into the nature of the information society and the social impacts of information technology.²

AGENDA

The range of topics to be addressed can be packaged in various ways, and no school would be able to address all relevant topics. At Berkeley, the plan adopted identified some central areas³:

1. Networked Information Systems: This includes not only the technology of heterogeneous distributed environments, but also methods for resource discovery, issues of security and privacy, and the impact on organizations.
2. User interfaces, human factors, and social dynamics: This area is concerned with designing systems that are easy to learn and effective for diverse users. It requires attention to cognitive behavior, social dynamics, human factors, and knowledge of users' needs.
3. Information access and retrieval: The move of different media to a digital environment on a very large scale greatly increases the complexity and the necessity for cost-effective resource description and search strategies for resource discovery. This area draws on expertise in database management, descriptive metadata, information retrieval, artificial intelligence, linguistics, categorization, image processing, and other fields.
4. Information policy: A wide range of economic, social, legal, and technical policies, especially those concerned with intellectual property, privacy and security, and technical standards, influence access to information, and, therefore, what people know.

No existing discipline or department covered this range. A multi-talented team, unified by a shared interest in a socially important problem area, is needed.

INFORMATION PROGRAMS

Different kinds of information programs co-exist. Each has a different role in the academic landscape.

1. Computer science programs are concerned with the application of algorithms to digital data. Computer scientists may become knowledgeable about application areas and may collaborate with specialists in other fields, but computer science is fundamentally not interdisciplinary;

² For discussion of the "liberal arts" of information studies see Buckland (1996).

³ University of California (1993).

2. Information systems programs, of the type commonly found in schools of business administration, are largely concerned with the application of computer science to a single organization's digital records. Information systems programs are somewhat broader than computer science programs in the sense that they are also concerned with the management of technology, the supervision of staff, and the need to perform within an organizational context.
3. Communications and media studies, currently being transformed by the new digital media, are primarily concerned with production in a emerging environment in which media are converging and anyone can be a producer.
4. Library science and documentation studies deal with the creation, organization, and use of collections of all forms and genres of documents, including digital records, in any context. They are, or should be, concerned with what people know, want to know, and need to know. Because this field is defined by the problem area that it addresses, rather than by any single method, it draws, as needed, on a wide range of other disciplines including statistics, computer science, linguistics, anthropology, management, economics, and law. These factors explain why most, not all, of the emerging information schools evolved from programs in library science.

LIBRARY SCIENCE

The phrase "Library Science" was coined by Martin Schrettinger, who was born near Nuremberg in 1772 and became a Benedictine monk.⁴ Although reprimanded by his abbot for his interest in new ideas, notably those of the philosopher Kant, he was made responsible for the monastery library. He abandoned monastic life in 1802, earned a living by organizing private libraries, and joined the staff of the Hofbibliothek, the Royal Library, in Munich. At this time the Bavarian government confiscated the collections of two hundred monastery libraries and gave them to the Hofbibliothek, making it, probably, the second largest library in the world. But it was also one of the least well-organized, since the library's eighteenth century procedures collapsed under this huge influx. The established library practice in the orderly age of Linneus had focused the physical arrangement of a collection according to the order of Nature, augmented by a systematic (classified) catalog based on that same order, and assisted by the erudite librarian's experience and memory when specific titles were wanted. After two library directors had conspicuously failed to bring effective order, Schrettinger was placed in charge and was able to demonstrate on a large scale the ideas he had been developing.

Schrettinger substituted a radically different approach. Influenced by Kant, he argued that the order of Nature was unknowable. Any attempt to define it was necessarily an invented human perception and there was no way to know whether it was correct or not. Therefore, library users would be better served by a simple, pragmatic subject arrangement, with each new book added at the end of its subject section so that the latest works would be readily identifiable. An alphabetical catalog, augmented by a list in shelf order, would enable the library user to identify individual works by author,

⁴ For Schrettinger see Vakkari (1994) and Garrett (1999).

title, and topic, with minimal dependence on the librarian.

Importantly, Schrettinger redefined the purpose of the library. The objective was no longer to reflect the order of Nature, but to provide access to the best available documents as rapidly as possible to the *Wissbegierigen*, those eager to know something: “*Eine `Bibliothek` ist eine beträchtliche Sammlung von Büchern, deren Einrichtung jeden Wissbegierigen in den Stand setzt, jede darin enthaltene Abhandlung, ohne unnötigen Zeitverlust, nach seinen Bedürfnissen zu benutzen.*” (“A `library` is a substantial collection of books, whose arrangement sets each person who is eager to know in the position to use, without loss of time, any treatise in it according to his need.”)⁵

Schrettinger believed that techniques of library service could be reduced to a small set of design principles (*Lehrsätze*) which, in sum, would constitute a discipline for which he coined the name *Bibliotheks-Wissenschaft*, Library Science, and for which, in 1808, he published a textbook entitled *Versuch eines vollständigen Lehrbuchs der Bibliothek-Wissenschaft oder Anleitung zur vollkommenen Geschäftsführung eines Bibliothekars in wissenschaftlicher Form abgefasst*⁶. In theory and in practice, Schrettinger defined the transition from the eighteenth century obsession with the “natural order” to the modern preoccupation with technique, system, and usefulness. He pioneered the modernist approach which was subsequently amplified by Melvil Dewey and others and which remains the dominant paradigm for the design and management of information systems to this day.

DOCUMENTS AND GENRES

Schrettinger derided the curiosities – peacock heads, rocks, pieces of wood – which still cluttered eighteenth century libraries, inherited from the “cabinets of curiosities” (*Wunderkammer*) of earlier centuries. Nevertheless, even highly selective libraries were always multimedia collections: not only printed codex books, but also sheets of manuscripts, painted portraits, maps, globes, and other scholarly evidentialia. Schrettinger was very clear that library science was concerned with the techniques for making suitable collections accessible to those seeking knowledge, that library science was distinct from book knowledge, and that library science dealt with collections of resources in all kinds of media.

To the south, in Graz, his progressive contemporary, the Habsburg Archduke Johann, envious of the industrial advances in England and France, was establishing an integrated learning center combining library, museum, and instruction, in an effort to induce agricultural and industrial innovation in Styria. In the statutes establishing his *Johanneum*, from which the present Technical University in Graz derives, he wrote that it should “give sense to these [collections], make learning easier, stimulate curiosity, help to avoid pure memorizing which is so detrimental to independent thinking and self-reliance, and fill more and more the harmful gap between formal concepts and intuition, theory and practice.” (“*Es soll dieselben versinnlich dadurch das Lernen erleichtern, das Wissbegierde reitzen, jenes dem Selbstdenken, und hiermit der Selbstständigkeit so nachteilige bloss Memoriren, jene schädliche Kluft zwischen dem Begriff und der Anschauung, der Theorie und*

⁵ Schrettinger (1808; also 1829), p. 11.

⁶ Schrettinger (1808).

der Praxis mehr und mehr ausfüllen helfen."⁷)

Schrettinger's guiding principles of rapid delivery of documents to the *Wissbegierigen*, those eager to know, indicates that he would have welcomed microforms, photocopying, and, above all, online access to network accessible texts. He would probably have noted with satisfaction the current expansion of national libraries (notably in Norway and the U.K.) to authorize and empower them to collect, and to claim through legal deposit, published documents in *all* forms: digital databases, analog recordings, websites, and computer games, as well as printed materials sold through traditional channels. The huge expansion in the number and forms of publication since his time validates his approach.

LIBRARY SCIENCE DEPARTMENTS IN UNIVERSITIES

Schrettinger designed purposeful procedures for providing effective library service. He enunciated principles that, he felt, constituted a discipline (a *Wissenschaft*). He wrote a text book and it would seem to follow that he would have approved of the establishment of educational programs for librarians. Given the preeminence of German universities, it would not have surprised him that the first university-based program was in Göttingen in 1886, shortly before Melvil Dewey's program in Library Economy began at Columbia University in New York.

A perceptive observer and a sharp critic, Schrettinger's approval would not have been unqualified. He criticized his eighteenth century predecessors for being unclear on the real purpose of libraries and for their failure to design effective programs. (He might now have some pointed remarks on the lack of clarity in the use of the word "information" which is widely used but given quite different meanings in different contexts.)

Schrettinger might also have been critical of the common failure of universities to think coherently and purposively about how they could sustain their nineteenth century success in developing programs responsive to major societal needs, in this case the unsolved policy and practical issues arising from the universally recognized shift to the so-called "information society" increasingly dominated by data and documents. There was a striking example a decade ago in California, when Al Gore, then Vice President, was making forceful statements on the need to understand, adapt to, and build for the "information age." One day the *Oakland Tribune* newspaper printed a long article on how improved documentation techniques could save billions of dollars annually in industry, and, on the opposite page, an article reported the intention of the campus administration of the University of California, Berkeley, to close its School of Library and Information Studies, the only department on the campus broadly concerned with documentation and with the information needs, policies, and technologies about which Al Gore spoke.⁸ The absurdity of this juxtaposition was too obvious to be missed by state officials and university decision-makers. One newspaper commented: "It doesn't take a Nobel prize winner to see

⁷ The Statuten of the Johanneum are reprinted in Göth (1861).

⁸ *Oakland Tribune* February 21, 1993, pp. B8-B9.

the foolishness of a proposal to close this school at this important phase in the information age.”⁹ Clearly the real question was how the University should modernize the school, not whether it should be closed. A planning committee was formed. Forward-looking recommendations were made and quickly adopted, and a School of Information Management and Systems emerged from the School of Library and Information Systems and was made a high campus priority. The outcome is more or less consistent with related developments elsewhere in the U.S.A., of which the School of Information at the University of Michigan and The Information School at the University of Washington in Seattle are among the more visible examples.

PURPOSES

Schrettinger was concerned with serving those eager to know in a situation in which the Hofbibliothek supported inquiries for a diversity of socially important purposes: civil engineering, legal reforms, religious doctrine, industrial and agricultural innovation, . . . Preservation of cultural heritage and serving dilettante scholars with antiquarian interests were not then the purpose.

When the Chair in Library Science was established at the University of Berlin in 1921, the distinguished scholar and librarian Adolf von Harnack offered advice in a newspaper article.¹⁰ Some people might expect such an institute to be concerned with deciphering medieval manuscripts, book binding, or other technical minutiae, he wrote, but this is precisely what is not needed. The real justification for a chair in Library Science, Harnack asserted, is the nation’s need to advance the effective deployment of knowledge. It was a theme developed later by the economist Fritz Machlup in his pioneering analyses of the very extensive economic significance of the production, distribution and utilization of knowledge, and, in consequence, the high rate of return on investment in the documentation of, and access to, recorded knowledge. Harnack had long been involved in government research policy and in the provision of infrastructure to support research. He placed the justification for a chair in Library Science firmly in the context of economic competitiveness. “*Die Professur für Bibliothekswesen gehört in den Kreis der nationalökonomischer Fächer, aber der geisteswirtschaftlichen.*” (“The Chair in Library Science belongs in the field of national economics, in the economics of intellectual production.”) Harnack’s view reflected the opinion of the more forward-looking librarians and documentalists of the 1920s. His claim is important, given a tendency of university departments in all fields: Where a vision of the underlying purpose is absent or decays, a preoccupation with routine technical and technological procedures takes over. Paleography and book binding have their role. Now one might think of XML and graphical interfaces. These are important, but even a competent department without the broader sense of purpose is a wasted opportunity.

Sadly, the University of Berlin’s decision-makers were not paying attention. The first appointee to the Berlin chair, Georg Leidinger, was a specialist in medieval manuscripts, who proceeded exactly contrary to Harnack’s advice, and his successor, Fritz Milkau, emphasized the need for a librarian to understand all academic disciplines, in effect reverting to the eighteenth century mentality that

⁹ *Oakland Tribune* March 24, 1994, p. A14.

¹⁰ Harnack (1921), pp. 218-220.

Schrettinger's ideas had replaced.¹¹

It was, in fact, a time with interesting developments and opportunities. In 1910, for example, the chemist Wilhelm Ostwald was so inspired by the work of the International Institute for Bibliography in Brussels that he used his Nobel prize money to establish, in Munich, an institute to address the world's information problems: Die Brücke: Internationales Institut zur Organisierung der geistigen Arbeit. (The Bridge: International Institute for the Organization of Intellectual Work).¹² Die Brücke emphasized standards for format and metadata and explored the hypertextual designs for a dynamic universal encyclopedia -- a "world brain" ("*Das Gehirn der Welt*"¹³). It was in Germany in the 1920s that Emanuel Goldberg, of Zeiss Ikon, developed the first use of electronics for document search and retrieval in a desk-top machine. Vannevar Bush later speculated on what Goldberg's technology could lead to in his famous essay "As we may think," which became a major inspiration for information science for the rest of the century.¹⁴ Also in the 1920s the University of Chicago launched a Graduate Library School, initially for doctoral students only, to undertake a systematic research program applying the latest social science techniques to the understanding of reading, books, library services, and society.

Milkau edited an encyclopedia of library science, yet he showed no appreciation for the tradition of technological modernism – from Schrettinger through Melvil Dewey, Documentation, and Information Science to today's digital libraries – that has been central to innovation in library science. Leidinger and Milkau symbolize, and contributed to, a long-term weakness in the development of Library Science in Germany. At the University of Berlin the most significant developments of the first century of Library Science were ignored.¹⁵

Schrettinger, if a patient man, would now simply point out that, with the headlong transition to digitization and connected networks, administration, commerce, and entertainment are all becoming document-centric, thereby creating greatly expanded opportunities for the application of Library Science (under whatever name). Effectiveness, efficiency and productivity depend, more and more, on the rapid identification, location, and access to the most relevant records and, in the "information society," a much larger proportion of the population is "eager to know" on a daily basis. Schrettinger would presumably agree with Harnack's view. With the steady expansion of genres of digitized documents and the record-pervaded environment of the so-called "information society," the need to provide services for people eager to know extends far beyond Schrettinger's experience at the

¹¹ Milkau (1926). Also Jochum (1994).

¹² Bühner and Saager (1911). Thomas Hapke has published several studies of Ostwald and Die Brücke, e.g. Hapke (1999).

¹³ Ostwald (1912).

¹⁴ Buckland (1992). Bush (1945).

¹⁵ The early years of the Professur at the University of Berlin are discussed in Leyh (1958), pp. 22-27.

Hofbibliothek.

LIBRARIES AND “LIBRARIES”

The difference between an apprenticeship and a science is that the former instills expertise for local application, the latter fosters principles of general application. We can use an example from Schrettinger’s lifetime. Steam engines were developed to pump water out of mines, but found wider application, including railways and shipping. Steam technology ceased to be (only) a branch of mine engineering and mechanical engineering evolved to include electricity, internal combustion, and other power sources, much as library science incorporated microfilm and digital technologies and found wider application. The vertical files familiar in offices everywhere was technology transfer from the library card catalogs and the international standard paper sizes (A4, etc.) derive from Wilhelm Ostwald’s efforts to extend bibliographic documentation to a broader range of documents.¹⁶ The central issue is the extent to which the principles developed for libraries are, like steam technology and mechanical engineering, applicable in other contexts and with new media.

Schrettinger’s library science was not, in principle, simply about books. Nor, as technique, was it necessarily limited to libraries. It is doubtful that Schrettinger could have imagined the extent to which society has come to be widely pervaded by documents, documentation, and large collections of documents: corporate records, patient medical records, legal paperwork, and so on. But just as he could be expected to welcome the practical usefulness of new genres of documents, so also, one may speculate, he would have viewed these situations as challenges for his Library Science. Can one call large-scale science data sets, corporate records, health care patient record systems, and websites “libraries”? Clearly, each is a collection of documents needing organization and to which rapid reliable access needs to be provided for the Wissbegierigen. Those eager to know are not less in need, or less impatient, when corporate profit or human health are at stake, and the motivation is increased in situations where there is a clear penalty for slow access. The remedy has, in fact been, in the expansion and adaptation of Schrettinger’s principles – sometimes conscious, sometime unconscious – in the early twentieth century onwards, often under the name “Documentation” and later as one of the meanings of “Information Science.” This broader application is exactly what should be hoped for and expected of a science, but this natural and desirable expansion has been accompanied by sustained semantic crisis. If Library Science is applicable beyond libraries does one continue to use the name Library Science and treat the new application areas as “libraries” or pick a new name for the science, such as “Documentation,” “Information Science,” “Information Management,” or use a cumbersome composite such as “Library and Information Science”?

SUMMARY AND CONCLUSION

The complexity and importance of the impact of new information technologies on society justify a response in university planning. Existing departments are concerned only with individual aspects. A new kind of Information School is emerging, designed to address the complex range of issues broadly.

¹⁶ Flanzraich (1993).

The scope is significantly wider than that of a School of Library Science. Nevertheless, a School of Library Science provides an appropriate foundation, arguably the most suitable existing foundation, for the development of an Information School and already has done so in the USA. As a broad simplification one might say that the late twentieth century shift from “Library Science” to “Library and Information Science” was largely concerned with the extension and application of Library Science techniques to data and document collections in any context: “digital libraries” generically in the very extended sense of the U.S. Digital Libraries Initiative administered by the National Science Foundation. And, as another broad generalization, the more recent shift to “Information School” has drawn much more deeply on insights from the social sciences and humanities for an understanding of the social and cultural aspects of knowledge in society, including the economics of information, social dimensions of technology, data privacy and security issues, and social epistemology (knowledge communities and their practices).

What would work in any particular university depends on the culture and traditions of that university, and on what already is in place. In a traditional, research-oriented university a plausible option would be to study knowledge and information as social phenomena, but it is important to retain relevant technical and technological expertise to assure a coherent understanding and also to ensure the competence to address difficult new problems. If the formation of a corps of elite professionals for the most complex challenges can be included, so much the better.

These developments are consistent with the ideas of Schrettinger and Harnack, who would doubtless hope that in Berlin the most significant developments of the second century of Library Science would not also be ignored.

REFERENCES

Buckland, Michael K. Emanuel Goldberg, electronic document retrieval, and Vannevar Bush's Memex. *Journal of the American Society for Information Science* 43 (1992):284-294.

Also <http://www.sims.berkeley.edu/~buckland/goldberg.html>

Bührer, Karl Wilhelm & Adolf Saager. *Die Organisierung der geistigen Arbeit durch die Brücke*. Ansbach: Seybold, 1911.

Bush, Vannevar. As we may think. *Atlantic Monthly* 176 (1945), pp 101-108. Also <http://www.theatlantic.com/unbound/flashbks/computer/bushf.htm>

Flanzraich, Gerri. The Library Bureau and Office Technology. *Libraries and Culture* 28 (1993), pp 403-429.

Garrett, Jeffery. Redefining order in the German library, 1755-1825. *Eighteenth-Century Studies* 33 (1999):103-123.

Göth, G. *Das Joanneum in Gratz*. Graz: Leykam, 1861.

Hapke, Thomas. Wilhelm Ostwald, the "Brücke" (Bridge), and connections to other bibliographic activities at the beginning of the twentieth century. In: Bowden, M., T. B. Hahn & R. W. Williams, eds. *Proceedings of the 1998 Conference on the History and Heritage of Science Information Systems*. Medford, NJ: Information Today, 1999, pp. 139-147. Also <http://www.tu-harburg.de/b/hapke/infohist.htm#ostw>

Harnack, Adolf von. Die Professur für Bibliothekswissenschaft in Preussen. *Vösische Zeitung* 27 July 1921), pp 218-220. Also at www.ib.hu-berlin.de/~wumsta/infopub/que/harnack1921a.html

Harnack, Adolf von. *Wissenschaftspolitische Reden und Aufsätze*. Herausg. von Bernhard Fabian. Hildesheim: Olms-Wiedmann, 2001.

Jochum, Uwe. Interview mit Fritz Milkau. 1994.

<http://www.langenacht-suedwestkirchhof.de/Programm/B%FCcherschicksale/B%20Buch%20Auszug.pdf>

Leyh, Georg. Der Bibliothekar und sein Beruf. In: *Handbuch der Bibliothekswissenschaft* 2. Aufl., 2. Bd, (1958), pp 1-112.

Milkau, Fritz. 1926. Bibliothekswissenschaft als Universitätslehrfach. *Minerva-Zeitschrift* 2 (1926):27-31.

Ostwald, Wilhelm. Das Gehirn der Welt. *Nord & Süd* 36 (1912), pp 63-66.

Schrettinger, Martin. *Versuch eines vollständigen Lehrbuchs der Bibliothek-Wissenschaft oder Anleitung zur vollkommenen Geschäftsführung eines Bibliothekars in wissenschaftlicher Form abgefasst*. Munich: Author, 1808-10. Expanded ed., Munich: Lindauer'sche Buchhandlung, 1829.

University of California, Berkeley. *Information Planning Group report*. Berkeley, 1993. www.sims.berkeley.edu/about/history/proposal.html

Vakkari, Pertti. The roots of library science in the internal and external discourse of *Historia Literaria* in Germany. *Bibliothek: Praxis und Forschung* 18, Nr 1 (1994), pp 68-76.