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### **Knowledge organization and information retrieval in times of change – concepts for education in Germany**

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#### ***Abstract:***

*A survey is given, how modifications in the field of the information processing and technology have influenced the concepts for teaching and studying the subjects of knowledge organization and information retrieval in German universities for library and information science. The discussion will distinguish between fields of modifications and fields of stability. The fields of the modifications are characterised by procedures and applications in libraries. The fields of stability are characterised by theory and methods*

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There have been many reports on the content of education at German universities for library and information science in the fields of knowledge organization and information indexing published in the literature.<sup>1</sup> In past years changes have not been presented continuously in view of speeding dynamics of

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<sup>1</sup> Cf. for example, Sickmann, L. (Ed.): Das Fach Sacherschließung in der bibliothekarischen Ausbildung: Vorträge der Fortbildungsveranstaltungen des Bibliothekar-Lehrinstituts in Verbindung mit der Gesellschaft für Klassifikation am 7. u. 8.12.1978 und dem Verband der Bibliotheken des Landes NW am 28. u. 29.3.1979. Köln: Greven 1980. (Arbeiten aus dem Bibliothekar-Lehrinstitut des Landes Nordrhein-Westfalen; V. 50); Gödert, W.: Klassifikatorische Inhalterschließung: Ein Übersichtsartikel als kommentierter Literaturbericht. *Mitteilungsblatt. VdB NW*. N.F. 40 (1990) v. 2, pp. 95-114; Gödert, W.: Verbale Inhalterschließung: Ein Übersichtsartikel als kommentierter Literaturbericht. *Mitteilungsblatt. VdB NW*. N.F. 41(1991) v.1, pp. 1-27;

development. It is not only the contents, but also the concepts that have changed increasingly. On the one hand, these changes are the result of a development within libraries marked by the introduction of Online Public Access Catalogues (OPACs) and the use of the Internet for research. On the other, they are the consequence of a more fundamental reorientation: Information indexing is no longer seen as only a data producing activity for the description of the contents of a book, but at the same time it takes into consideration the retrieval of that data within the electronic environment.

The following understanding forms the basis of today's concept: Important and reliable methods of classification and indexing have to be kept and supplemented by methodical basics of modern, technically supported procedures in the fields of subject indexing and information retrieval. Both have to be illustrated by examples from fields of application that are changing constantly and include not only libraries<sup>2</sup>.

German education in the fields of knowledge organization and information indexing has always traced international developments and integrated them into the curricula, at least on the level of method, though not so much on the level of specific applications. For example, *Ingetraut Dahlberg's*<sup>3</sup> study "Grundlagen universaler Wissensordnung", which compares and analyzes the world's most important universal classification systems, had a great influence on curricula and their methodic organization. This study strongly influenced the consideration of faceted classifications<sup>4</sup> and the reception of the work of the Classification Research Group. This also later resulted in a more intensive discussion about the *Preserved Context Index System (PRECIS)*, although this actual method has never been used in German libraries<sup>5</sup>.

Consideration of international developments has led to a methodical basis which is still part of the curricula. This basis comprises the content analysis, the epistemological, structural and linguistic foundations for the production of verbal and classificatory documentation languages. It both contains the principles of coordinated and syntactic indexing and also principles and tools for post-coordinated Boolean retrieval. Recently, linguistic and statistically based methods for retrieval as well as methods of automatic indexing have increasingly been taken into consideration.

In this way, information indexing as a core discipline within the curriculum of education for library and information science has taken over the responsibility to extend certain methods of analytical thinking and deriving conclusions to students.

This means for example that in the treatment of classificatory indexing one has to deal with the conceptual organization of classification systems (what is a class?, what is meant by structure?). One also has to mediate the basic features of enumerative classification systems, systems with standard subdivisions and

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Schulz, U. Zur Didaktik der inhaltlichen Erschließung in der Ausbildung von Diplom-Bibliothekaren. *Bibliothek: Forschung und Praxis*. 16 (1992) v.3, pp. 255-263.

<sup>2</sup> The presentation given here is based on the curriculum at the Department of Library and Information Science at the University of Applied Sciences, Cologne. With necessary adaptations it can be seen as typical of other German universities in the field of training librarians.

<sup>3</sup> Dahlberg, I.: Grundlagen universaler Wissensordnung: Probleme und Möglichkeiten eines universalen Klassifikationssystems des Wissens. Pullach : Verlag Dokumentation 1974. (DGD-Schriftenreihe; Bd.3).

Cf. also: Dahlberg, I.: Major developments in classification. *Advances in librarianship*. 7 (1977), pp. 41-103.

<sup>4</sup> Important for the treatment of faceted classification schemes: Buchanan, B.: Theory of library classification. London: Bingley 1979. (Outlines of modern librarianship; vol.11). Also pub. in German as *Bibliothekarische Klassifikationstheorie*. Übers. von U. Reimer-Böhner. München: Saur 1989.

<sup>5</sup> Deutsches Bibliotheksinstitut (Ed.): PRECIS: Für die Anwendung in deutschen Bibliotheken überarbeitete u. vereinfachte Form des syntaktischen Indexierungsverfahrens der British Library. Berlin: Dbi 1984. (dbi-Materialien; Bd.35). Reviewed J. Austin *International classification* 12(1985) pp. 41-43.

facets, as well as discuss the possibilities for their particular potential applications concerning shelf arrangement, organization of catalogues and retrieval.

After this more pure or theoretical discussion, the curricula have to consider those methods which are applied in the libraries. Within the area of classification and indexing there are a variety of classification schemes for shelving. Additionally - caused by the historical developments in Germany<sup>6</sup> - a lot of classification systems that do not reflect the order of books on the shelves but are used for catalogues have to be mentioned. Just recently, the future use of the DDC for national bibliographic services and the synchronization with international projects for indexing have been discussed<sup>7</sup>. In the field of verbal subject indexing the *Regeln für den Schlagwortkatalog (RSWK)* and the *Schlagwortnormdatei (SWD)*, which is the basis for cooperative indexing, are considered in the curricula to some extent. It is not the main objective to impart knowledge about the code in detail. It is rather a question of mediating the principal characteristics of verbal documentary languages in order to represent the contents of documents in a coextensive way. These characteristics are, for example, the forming of concepts, terminological control, concept relations and possibilities of their representation. Then, rules for the choice of subject headings are of equal importance to the principles of creating and applying a thesaurus.

The latter is especially taken up when dealing with approaches and methods to make indexing results searchable within the online environment, e.g. retrieving precombined subject headings or classification notations by their verbal representations. Technical changes have caused a reorientation here. Formerly, methods of filing for the production of card catalogues or lists in book catalogues were top priority. But now, methods for retrieval have been added. It is important to consider the possibilities for searches within a wide range of retrieval environments: OPACs, all kinds of literature databases – no matter whether CD-ROM or online databases, a selection of fact databases and especially the Internet with all its different offerings, directory services and search engines.

In dealing with OPACs one has to consider the range from in-house solutions to WebOPACs. One has to note questions concerning retrieval features, user behaviour from respective studies as well as possibilities of data interchange.

Certain questions are common in all retrieval environments, but they look different on the surface. Great importance is therefore attached to the mediation of structural common characteristics. Because of this, the students should be able to acquire competences on a methodic meta level in order to be able to pursue future developments independently on their own.

Within this context, central questions are the interplay between measures in the area of vocabulary in order to improve the retrieval results and the possible roles that tools and methods of information retrieval might play, if necessary as replacement. This interplay comprises, for example, retrieval characteristics of uncontrolled vocabulary and the characteristics of extracted, standardized descriptors.

Possibilities for the production of conceptual navigation tools on the basis of standardized vocabulary are also discussed. This includes the possible roles classification systems can play as means of structure for navigation, and also comprises the role of appropriate indexes as entry vocabulary.

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<sup>6</sup> Nohr, H.: Systematische Erschließung in deutschen Öffentlichen Bibliotheken. Wiesbaden: Harrassowitz 1996. (Beiträge zum Buch- und Bibliothekswesen; Bd.37); Lorenz, B.: Systematische Aufstellung in deutschen wissenschaftlichen Bibliotheken. 3rd ed. Wiesbaden: Harrassowitz 1995. (Beiträge zum Buch- und Bibliothekswesen; Bd.21)

<sup>7</sup> Einführung und Nutzung der Dewey Decimal Classification (DDC) im deutschen Sprachraum: Vorgelegt von der Arbeitsgruppe Klassifikatorische Erschließung im Auftrag der Konferenz für Regelwerksfragen. Frankfurt: Die Deutsche Bibliothek 2000

Search tools on the Internet play an important part if used as examples. One can indeed use the students' familiarity with these aids (which certainly exists) to deal with more demanding subjects. For example, one can use *Yahoo!* to discuss different problems concerning the systematic arrangement of subject gateways. Most search engines are good examples for retrieval characteristics of free-text and principles of relevance ranking. This can be supplemented by special characteristic features of search engines like *Google* (citation ranking) or *AskJeeves* (computational linguistics). The discussion can also be combined with products like *Knowledge Finder*® and its special indexing and retrieval features. In this way, the number of examples has both increased and also become varied and makes familiar procedures (like citation indexing) appear in a new light.

The use of procedures of automatic indexing has become of interest to libraries because of the increased consideration of information indexing from the user's point of view<sup>8</sup>. Not all the titles in German library OPACs contain controlled data produced by subject indexing. And this won't change in the near future despite various plans in the fields of retrospective digitization and the increased consideration of external source data. Procedures of automatic indexing can create a homogeneous situation for retrieval if they make use of intellectually produced and structured vocabulary. If the results meet the expectations of German-speaking users, one will have to take the fundamental dependency of languages into consideration when choosing the appropriate methods for automatic indexing. This has resulted in the development of specific procedures of indexing for German documents, which are dealt with<sup>9</sup> in the curriculum. The treatment of these specific methods has to be supported by general and computational linguistic basics.

In order to be able to discuss the sense and profit of automatic indexing in comparison and addition to other (mostly intellectual) indexing procedures correctly on the level of method, principles how to realize retrieval tests and their results have further been integrated into the curricula. The range extends from specific tests in library OPACs to methods and results of the *Text Retrieval Conferences (TREC)*.

Subject indexing can no longer be applied to the document type "book" only. It also has to consider other forms of information media, for example images, films, sound carriers and web-pages. In addition to this, the limits of the field of application have become fluid: Next to specialized in-house-solutions for defined groups of users, one has got cooperative efforts in the field of libraries or even projects to produce web-based subject gateways or information portals with partners coming from various scientific fields or the information industry.

More and more, international indexing projects have to be seen in the context of multilingual demands. That is why these problems on the fundamental methodic level as well as on the level of application have been integrated into the curricula.

Increasingly, approaches for standardization (data formats, authority files, metadata) and methods for data interchange are taken into consideration. One can expect that concepts like *XML (Extensible Markup Language)* will gain more importance in the future. But, more and more, you have to weigh up which field you want to pay more attention to: either the specific library approach or the general approach to the solution of problems. Today, there is certainly a trend towards the general approaches. Yet it remains a challenge to ensure that the specific library necessities do not come off worst.

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<sup>8</sup> Gödert, W., K. Lepsky: Semantische Umfeldsuche im Information Retrieval. *Zeitschrift für Bibliothekswesen und Bibliographie*. 45(1998) v. 4, pp. 401-423.

<sup>9</sup> Lepsky, K.: Automatische Indexierung zur Erschließung deutschsprachiger Dokumente. *Information Wissenschaft und Praxis*. 50(1999) v.6, pp. 325-330.

Recently, this trend has become clear in the understanding of knowledge organization and information retrieval at German universities that are dedicated to information economy. Results of Information indexing in this context are considered not only as a necessary precondition for individual knowledge acquisition but also as a part of a chain of value added under secondary economic conditions and, because of this, as a part of the so-called knowledge management. Preoccupation with new methods and procedures as well as the treatment of the question what is meant by knowledge and information in the context of knowledge organization and information retrieval follows on from this. In this way, reflections on content analysis and structure of knowledge, which have traditionally been embodied in the curricula from an epistemological and concept theoretical point of view, are complemented by developmental psychological and cognitive understandings<sup>10</sup>.

In order to mediate all the problems mentioned above, nowadays forms of teaching are chosen which enable the students to work practically. For example they do exercises concerning searches in bibliographic databases and the retrieval tools of the World Wide Web in a laboratory environment with instruction and checks. Additionally, they use appropriate software products in order to deal practically with the structure of bibliographic databases, the production of controlled vocabulary and the procedures in automatic indexing after the students have been introduced to the relevant methods.

All in all, one can characterize the aims of current education in the fields of knowledge organization and information retrieval as approaches to gain competences in dealing with information systems and, if applicable, how to produce information systems in different areas of application, especially in the future. These competences should comprise the analysis and extraction of information in a structured way and varied methods of accessing this information. In order to take the starting specialization into account not all questions are obligatory for all students. This applies especially to subjects in the fields of data formats, data interchange, the application of automatic indexing as well as to the active shaping of retrieval systems.

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<sup>10</sup> Gödert, W.: Grundlegung einer konstruktivistischen Informationstheorie und ihre Konsequenzen für die Gestaltung von Informationssystemen. *Die digitale Revolution: Deutscher Dokumentartag 1996, Neue Universität Heidelberg, 24.-26.9.1996*; ed. W. Neubauer. Frankfurt a.M.: DGD, 1996. pp. 351-365. (DGD-Schrift: DOK-9); Gödert, W.: Information as a cognitive construction: a communication-theoretic model and consequences for information systems. *Knowledge organization*. 23(1996) no.4, pp.206-212.