

# Curriculum development in the field of information science: knowledge organization courses

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**Abstract - This paper will examine new curriculum developments in the Department of Information Sciences at the University of Zagreb. The TEMPUS project offers the opportunity for planned and organized efforts for curriculum change in courses within the field of knowledge organization. This paper explains the main rationale and need for these changes as well as steps that have already been planned and undertaken. The objective of these changes is to improve course organization and coherence and modular flexibility throughout different programmes in the Department. During the first year of the TEMPUS project the focus was on rethinking and modernizing course content. This was achieved through analysis of knowledge organization course syllabi worldwide and through organized visits to two universities in the United Kingdom. This paper will shed some light on new and common subject areas within the field of knowledge organization, and the rationale behind including new topics in existing modules.**

## I. OVERVIEW OF THE CURRICULUM DEVELOPMENT IN THE DEPARTMENT OF INFORMATION SCIENCES (DIS)

The department of Information Sciences at the Faculty of Philosophy, University of Zagreb (DIS) offers both undergraduate and postgraduate programmes of study in the field of information science. There are four main subject areas of study (branches) that lead to B. A. and M.A degrees: librarianship, informatics for social sciences and humanities, museum studies, and archival studies. Education in these four main branches is designed to be complementary and to contribute to the coherence of the field of information sciences. However, professional practices established in institutions such as libraries, museums and archives have been respected and followed by the DIS. Because of economic, cultural and political reasons, libraries, museums and archives in Croatia have not yet undergone the changes that have reshaped information services in the rest of Europe and the world for the past ten years.

A few decades ago, there may have been some reason to question the coherency of the field of information sciences, but today the global information space and communication technologies have brought library, museum, archival and informatics professionals closer than ever. Information professionals have always had a fundamental role in education and science. They are also considered essential in exposing and presenting assets of

culture and heritage, and they are viewed as valuable contributors to the industries and businesses that exploits these assets. The modern information society has further strengthened the role of professionals involved in information organization, management and access, but at the same time has put higher demands on expertise and competences that are expected from information field specialists. These are important signposts in evaluating and rethinking the mission of information professionals' education in the current curriculum development at DIS.

The DIS curriculum underwent significant change with the introduction of Internet technology in teaching in the nineties. Since 1996, the Internet has become both a teaching aid and the subject of research and education in all four branches. These changes have especially influenced curriculum development in the field of librarianship and courses of knowledge organization. Some major changes have occurred in the subjects which belong to this common field: the theory of classification, classification systems, and document indexing. This resulted in the expansion of the area of indexing and information retrieval, and changes in content and methods of teaching classification. These developments evolved into active research fields within the DIS and as a result, numerous surveys and evaluations were described in over 30 reports, conference papers and articles (the list of these is provided on the project site <http://www.ffzg.hr/infoz/tempus/publications.htm>.)

With the further development of network technology and changes in information management, this first phase of curriculum development activities transgressed to more specific research into emerging and rapidly expanding subject areas. Expertise in metadata systems, network information architecture, knowledge management, knowledge organization in digital libraries, portals, vortals and hubs, are about to reshape the professional profile of future library, archival and museum specialists.

In 2001, DIS teaching and research staff have started several projects to enable further planned and organized curriculum development that would bring the way this new subject areas are exploited in library and information science (LIS) curricula in line with international practice. The endorsement of ECTS - the European Credit Transfer System - by Croatian universities, in the period 1999/2000, has put even more stress on the transparency and compatibility of this curriculum. Also, with the implementation of new projects, course delivery and

teaching techniques that have not been subject to review and revision for some time have been brought to the attention of academic and research staff. The previous phase of curriculum research and development, spanning the period from 1996 to 2001, has clearly demonstrated a potential area of development in teaching techniques and methods and further expansion of the virtual learning environment. The growth in the number of part-time students in, for instance, librarianship, has also brought into focus the need to update and digitize course materials, and to establish better procedures for course administration and communication with students. This has now become the focus of two research projects.

The first is a three year project: *Organization of Information and Knowledge in the Electronic Learning Environment* (Organizacija Informacija i znanja u elektroničkom obrazovnom okruženju - <http://infoz.ffzg.hr/oizeoo>), and is funded by the Croatian Ministry of Science. It explores issues within the electronic learning environment and started in September 2002. The second project addresses curriculum content development including issues of delivery, presentation, course organization and evaluation, and is being developed under the umbrella of the TEMPUS project. This paper will summarise the curriculum development planned and the progress achieved within a section of the TEMPUS project undertaken by the DIS. It will list the main objectives of the project and highlight important issues of change within the information science curriculum, specifically in the area of knowledge organization. An overview of achievements made within the first 12 months of the project will also be given. Ongoing and future efforts of the team at the Faculty of Philosophy, University of Zagreb, can be observed at the project team web page <http://www.ffzg.hr/infoz/tempus/>.

## II CURRICULUM DEVELOPMENT IN THE TEMPUS PROJECT

The TEMPUS project - Aspects of Organization and Information Systems: Curriculum Development (CD\_JEP-16086-2001), is a European funded project approved to run from April 2002 to April 2005. The objective of the project is to improve the curricula of 18 courses at three Croatian universities from the following fields: information systems, information sciences, mathematics and economics. Croatian partners involved are the University of Zagreb, University of Rijeka, University of Osijek, Microsoft Croatia d.o.o., and the Croatian Operational Research Society. European partners are Karl-Franzens Universität, Graz, Albert-Ludwigs Universität, Freiburg, South Bank University, London, London City University, and The Amsterdam School of the Arts, in Amsterdam. The project is coordinated by the University of Zagreb, or more precisely the Faculty of Organization and Informatics in Varazdin. Other Faculties from University of Zagreb included in the project are Faculty of

Philosophy within the DIS, the Faculty of Economics, and the Department of Mathematics at the Faculty of Science.

The project team at the DIS is focused on developing the curriculum in the areas of information sciences and information management. Undergraduate courses in knowledge organization that are going to be used as a test-bed area are:

- Classification and Classification Systems (librarianship)
- Indexing and Information Retrieval Systems (librarianship)
- Thesaurus Construction (librarianship)
- Collection Management (museum studies)

In order to change this particular core subject area, DIS TEMPUS team is working in close collaboration with two European partners: the Library and Information Services at South Bank University and the Department of Information Science at City University.

This specific work area of the TEMPUS project has the following goals and objectives:

- re-design and restructuring of courses in the field of knowledge organization in order to make them applicable to all branches of information studies: librarianship, archives, museums and informatics
- explicit modular organization of courses that will enable a faster adaptation to different programmes of study: part-time, distant learning, upgrade to postgraduate studies, and special thematic courses (e.g. knowledge organization for commerce and industry, thesauri in collection management, knowledge organization for portals and vortals, controlled vocabularies in metadata)
- standardization of course delivery and course material organization and formatting that will enable automation of course administration and ease the implementation of learning management systems and digitization of learning material
- establishing procedures and criteria in course design, management and delivery that will enable easy induction of new staff and inclusion of research staff into teaching; better quality control and teaching quality assessment.

These objectives are put into an achievable, 36 month DIS work plan. Work on the curriculum is organized into ten work packages and will produce the following curriculum specific deliverables:

- requirements and specification for course development
- course **content expansion and improvement**; plan and implementation
- course **delivery** change and implementation
- **digitization of course material** and template design
- guidelines for **marking, evaluation and exam procedures**, mapping to ECTS
- guidelines for **assignments and coursework** procedures

- guidelines for **student supervision and tutoring**; procedures for electronic communications, chatrooms and online-forums,
- guidelines for measuring and evaluating **student feedback**.

Planned deliverables are combined with activities defined for the entire TEMPUS project. The most dominant part of these activities is staff and expertise exchange with European partners.

In the first year, the DIS project team has achieved the following: definition of targeted curriculum development areas, content expansion preparation and course structure analysis. This was accomplished through the exchange of expertise with City University and South Bank University but also through analysis of the syllabi of other information studies schools, and also through the observations of topics and themes in knowledge organization research projects, conferences and publications and participation on the discussion lists.

An observation of course delivery at the Department of Information Sciences, City University, was accomplished through visits and participations in their courses but also by using City's learning management system remotely and accessing their online learning materials. Information on new content for knowledge organization courses was also collected through research into syllabi of other library and information studies schools such as the Department of Information Studies at University of California, Los Angeles (<http://is.gseis.ucla.edu/index.asp>), School of Information Studies, Syracuse University (<http://istweb.syr.edu/>), The Graduate School of Library and Information Studies, University of Illinois at Urbana-Champaign (<http://alexia.lis.uiuc.edu/>), School of Library and Information Science, University of North Carolina at Chapel-Hill (<http://ils.unc.edu/ilshome.html>), The Department of Information Studies, Sheffield University, UK (<http://www.shef.ac.uk/uni/academic/I-M/is/home.html>), Department of Information Science at Loughborough University, UK (<http://info.lut.ac.uk/departments/dils/index.html>), and many others.

### III. WORLD PERSPECTIVE AND COMPARISON

In the field of information studies and information science, American and British universities have always played a leading role. They were the first to establish education in information studies at the university level and ever since they have been a model and lead the way in development of the profession. When a Croatian university engages in comparison with American higher education institutions or when one establishes a project partnership with, for instance, British information study schools, it is important to fully understand the context and differences between higher education in these countries.

Information study programmes in the United States and United Kingdom are mostly offered as one year

postgraduate degrees (master degree in information studies or library and information studies - M.A. or M.Sc. or MLIS). Students enrolling on this degree course are usually information professionals who wish to acquire proficiency and expertise that will enhance their career prospects and this will be their only degree in the area of information studies. In this respect, this postgraduate degree is equivalent to our undergraduate additional degree in librarianship, museum or archive studies which provides fundamental professional skills and competences. However, while an American or English postgraduate diploma/title, itself, does not bear as much significance as the actual knowledge behind it and is often not required by employers, it is completely the opposite with Croatian undergraduate degrees which are required by employers and regulated by employment law. Croatian undergraduate studies are similar in content to American and English postgraduate studies and are treated as equal in project research and academic exchange. A Croatian master degree in information studies is, however, by definition a second degree in the field and because of the length of study and the extent of the master thesis, it is much closer to the Master of Philosophy degree (MPhil), as it is called in British higher education. There is no equivalent in Croatian higher education.

Universities in Great Britain and America are predominantly self-financed i.e. only partially financed by government. The amount of government funding depends upon the teaching and research quality which is, for instance, in the U.K. assessed by QAA - *Quality Assurance Agency for Higher Education* (<http://www.qaa.ac.uk/>). There is constant competition amongst universities to achieve excellence in teaching and research, to attract the best students, and provide enough income to sustain themselves. It is not unusual that academic departments, faculties or even universities are closed when they fail to meet professional quality assessment targets and cease attracting a sufficient number of students.

Most of the cost (teaching staff, facilities and library resources) of an academic degree is borne by the student. The cost of studying is one of the reasons why the duration of the information studies degree is compressed to only one year. In terms of workload, however, this puts much more stress on both students and lecturers. The full time course of study requires such an amount of lectures, tutorials, reading, and coursework that it forces students to take one year leave from their jobs and pay full attention to their studies. Also, proportion of attention paid to students in the form of individual tutorials and coursework supervision is equally high. The current problem in British higher education is that the share of funding given by government is being constantly reduced while the number of students keeps growing. British and American schools of information studies are purely market driven and thus very eager to respond to the demands of the job market. They are much quicker to react to the needs for new expertise and different universities are competing to attract the desired number of students by offering new degree

titles, new courses appealing to the market, and desirable content to go with them.

This situation shows obvious dissimilarity with Croatian higher education but comparison with more accelerated and more efficient Anglo-American education systems is, nevertheless, useful. Once the context is understood, much of the information harvested from analysis of American and English syllabi and education in general can be easily interpreted and applied in Croatia.

Consultancy with project partner South Bank University's "Library and Information Services" department was especially useful in order to summarise competencies and expertise needed in a modern academic library environment for managing web technology and expanding new information resources and services, such as:

- university electronic and learning resources management
- electronic publishing management
- creation and maintenance of content management systems and university intranet
- purchase and management of literature copyright issues
- access to university, national and international distributed library systems
- access to bibliographic databases
- electronic journals management
- inter-library lending and document supply (electronic delivery)
- IT training for students and staff

The main library in South Bank University, visited by the Zagreb team for instance, employs and trains librarians who carry out this as well as all other traditional library services used by 15,000 students.

Staff exchange with City University in London, on the other hand, offered a closer look at course delivery and course content in the field of knowledge organization that is typical of British universities. This includes the content of course programmes tailored to satisfy market needs such as master degrees in electronic publishing, pharmaceutical information management, health care technology, geographical information etc. The organization of course delivery was also observed. Some courses are organized and run throughout the year, others are compressed in, for example, 10 or 12 weeks. Course material is provided on-line and learning management systems are in place to support both regular and distant learning, which enable intensive subject oriented teacher-student, and student-student communication.

In this first year of the TEMPUS project the focus of DIS was primarily on the structure and subject content of the knowledge organization courses. The courses, covering the wider area of knowledge organization throughout the world, were carefully observed. The primary interest of the work in this phase was learn about the scope of the field of knowledge organization with respect to new and emerging topics and standards.

#### IV. FIELD OF KNOWLEDGE ORGANIZATION - RATIONALE FOR DEVELOPMENT

The steady but rapid growth of digital collections, and the development of new information systems and related services, has improved access to information and has influenced the organization and management of information resources. Some professional competences that were the specific expertise of archive, library, and museum specialists have become sought after, and applied beyond, their traditional environment. Nowadays, there is need to structure and organize heterogeneous information resources in industry, businesses, education, government, geographical data, and community services. It is necessary to set up and establish principles for their organization and access, and understand user requirements and behaviour in the process of information discovery. However, transfer of traditional expertise into new fields of application is not straightforward. Transfer of expertise does not happen on the level of library, archive, or museum specific skills, but on a deep and thorough understanding of the principles, theory and requirements behind them.

This affects objectives guiding the education of information professionals. This is why it is considered wise to base education on, for instance, the principles of classification - such as facet analysis, taxonomical and associative relationships - rather than focusing on the application of one system as used, for instance, in a library or some other bibliographic database. Principles, such as those of classification, are equally applied in entity relationship modelling and object oriented programming as they are in building knowledge organization tools such as a classification scheme. Equally, it makes sense to offer knowledge on the principles of a surrogate, i.e. metadata used in information retrieval, as this will enable understanding of any new metadata system, its production and management rather than teaching one cataloguing standard. Once the concept of technical, administrative and technical metadata is understood, it is easy to understand the principles of transport, exchange and its role in information discovery or indeed information management.

Although the global integration of digital libraries and seamless access to distributed and heterogeneous resources has yet not been realized, serious effort and initial steps have already been made. The future is already specified through the next generation of the Web - called the semantic web [2]. This developing generation of the Web is closely dependent on metadata and machine understandable statements about Web resources. Many standards have emerged that link exchangeable and transportable data structuring and binding with appropriate harvesting and communication technology: XML/RDF, SOAP, OAI, Microsoft .Net technology and WebServices, to mention a few. In spite of these advances the greatest obstacle to information exchange remains on the level of data content and semantics. This is the area where expertise in metadata systems, vocabulary control and

knowledge organization in general, is the most valuable. Information study schools worldwide try to anticipate these developments and change accordingly. [1], [5], [6], [7].

The field of knowledge organization in its wider sense comprises all methods, tools and techniques that serve to intellectually and physically organize, manage, represent, discover and use information and knowledge. This spans fields scattered in many areas of information study such as classification and indexing systems and tools, and information organization and retrieval. But this would also often relate to areas with distinct IT boundaries such as artificial intelligence (especially the area of automatic indexing, automatic classification, expert systems and knowledge representation). There are some recently formed fields of expertise, such as knowledge management. Although this is clearly management oriented, it builds upon, and applies some knowledge organization methods and tools, and embraces the whole body of expertise from information science and computer science. Identified as a field that includes information studies, computer science and management, knowledge management has already become a part of the information studies curriculum in many library and information studies schools [3], [8].

This kind of integration and interaction of subjects and disciplines is part of the pervasive nature of the global information space that leaves no human activity or discipline unchanged. Creation, management, organization and use of information stem from this as a single field of expertise, irrespective of sector boundaries. It is not feasible to educate archive or museum specialists who will not know whether, why or how to implement, for instance, a thesaurus in their collection description metadata. Nor is it wise to have a librarian who will not know how to construct and model a thesaurus, classification or any other knowledge organization tool in order to make it shareable and usable across different sectors including business or government. Every day we witness yet another archival collection being exposed and merged with museum object images and descriptions, which are being organized and retrieved by library tools. The uniqueness of archival and museum resources and the importance of their provenance does not alter their value as information objects. And information objects ask to be accessed in many different ways and are being called upon from different contexts.

In terms of education, knowledge organization courses need to provide the skills and competences that reach as far as the pervasive nature of knowledge. Boundaries between sectors and domains, institutions and professions are only artificial in this respect.

## V. COURSE CONTENT CHANGES

The courses in the field of knowledge organization taught in the information study schools are characterised by a great difference in granularity and scope. Some

schools analysed would split this field into two courses covering everything or sometimes having three or four courses focused narrowly. The course which shows the most coherence and is present throughout dozens of syllabi that has been examined, is on information retrieval. Other courses are harder to identify but there is always at least one distinct module that covers indexing, classification, and often cataloguing with irregular distribution of topics. In most situations, information study curricula would have at least one IR course as a compulsory module, and at least one course covering indexing, classification, cataloguing or metadata in general. The number of topics, as well as the depth to which they are presented, is also very different. When comparing syllabi from different LIS schools, it was easier to look for topics and specific questions than to compare entire modules.

During the research in 2002, a number of knowledge organization topics were identified that we have already included in our curriculum change in 1996, but which are now established as compulsory learning subjects in most information studies programmes. These include:

- network information discovery metadata
- subject gateways on the web
- search engines
- standard for metadata encoding, transport and exchange
- standards for content structuring and encoding
- information interface protocols

We have also identified a number of topics in the area of knowledge organization that have not yet been introduced in structured and organized syllabi within existing courses in any of Department degree programmes (librarianship, archival studies, museum studies or informatics):

- knowledge management
- content management and CMS
- portals/vortals/hubs
- knowledge representation (ontological languages and tools)
- metadata harvesting protocols and systems
- special sectors of information expertise: geospatial, community services, education, government

Analysis of the curricula helped to determine with more certainty the direction of further development, and how this reflects on courses in the knowledge organization field. Based on this it is now possible not only to add new content but to redesign the number of courses in a modular way, choosing topics to be part of compulsory syllabi and then offering an in depth approach in elective courses or postgraduate studies. This work has influenced and helped to put together the proposal for the new 3 + 2 year programme of study in information science, in line and compatible with ECTS.

The next step is to look into preparing a syllabus for 2003/2004 and 2004/2005 that will contain some of the newly designed course materials and to find out how new topics can be properly grounded in the existing curriculum. This will focus on building transferable knowledge and

skills following the three level suggestion of the course designed by Boettcher: *core concepts and principles, well structured problems with known solutions, and less-structured, complex problems without known solutions.* [4]

## VI. CONCLUSUION

Curriculum development is linked to general degree objectives, the departmental mission, course delivery, and anticipated changes in the field, but is also dependent upon interaction between different course modules and the distribution of the subject area. In the case of the Department of Information Science in Zagreb, it was decided to approach curriculum changes on all levels of educational procedure with 36 months of joint effort between lecturers and teaching assistants. This attempt is clearly a bottom-up strategy that starts change with small and achievable goals: in this case, four courses from the same sub-field of information science. By implementing these changes, the main goal is to develop procedures in course management and impose an acceptable and general course structure model which can be easily applied to any other course. The course development is a complex procedure and this has to be mastered in itself in the area of information science education. As has been pointed out throughout the paper, this field is likely to be more exposed to unpredictable changes affected by the development of technology, and the curricula has to accommodate great flexibility and be easy to adapt and manage.

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