

Are Emerging Digitization Technologies Approachable to All? The Learning Experiences of Future Librarians in Creating Online Collections

Jennifer Lafleur and Elena Vassilieva

Introduction

This paper presents an overview of the authors' experiences in creating individual online collections of digital objects using CONTENTdm digital collection management software by DiMeMa, Inc. in a classroom environment. The learning process took place during graduate coursework in an Advanced Digital Imaging Management course at the University of North Texas, School of Library and Information Sciences, in the spring semester of 2006. The main course project was for each student to build a unique digital library with appropriate metadata, indexing, search functions, and usability testing. The course helped participants gain an understanding of digital collections architecture, industry standards, design and content issues, and controlled vocabularies, and also provided experience with digital archiving and the planning and management of digital collections.

Discussion of factors that contributed to the learning process is included in the paper, along with a description of the stages used in creating digital collections. It summarizes major skills and qualifications acquired during the learning process. The final part of

the paper presents lessons learned and recommendations.

Results from this study may be used to improve the student learning process at LIS schools during training for creating collections of digital objects.

Literature Review

Digitization Projects

There is a wide variety of literature on the use of different technologies, content management applications, and software for creating digital collections on different topics, of different scales, and in different environments. In 1998, Cleveland summarized main directions in development of digital library collections and major problems facing the overall digital collection creating process.¹ Many of the problems pointed out in the overview still exist and intensify in the current digital collections community.

Lopatin examined literature on library digitization projects from the years 2000 to 2005 and presented findings on the practices of management, funding, selection of materials, creation of metadata, legal issues, approaches to interoperability of varied

Jennifer Lafleur is a Graduate Student, e-mail: Jennifer.Lafleur@unt.edu; Elena Vassilieva is a Doctoral Student, e-mail: Elena.Vassilieva@unt.edu. Both are at the College of Information, Library Science and Technologies, University of North Texas

collections and databases, preservation, and intellectual property rights.² Many authors concentrate on analysis and discussion of major initiatives and projects in the digital collections arena. Griffin presented a brief history of Digital Libraries Initiative (DLI), main characteristics of its two phases, and noted interdisciplinary approaches in digitization.³

Digital Collections and CONTENTdm

Literature from the information sciences field describes examples of the CONTENTdm platform in projects involving academic libraries and other organizations. Bond described development of two projects at Washington State University using CONTENTdm and discussed advantages of the software, metadata standards used in the projects, the process of creating metadata, use of CONTENTdm tools to customize digital collections, use of various software platforms for collection creation, use of controlled vocabularies, and preservation of digital images.⁴ Arlitsch and Jonsson wrote about Mountain West Digital Library (MWDL) created through cooperation of six digital centers in Utah and Nevada. The project was based on the CONTENTdm Multi-Site Server. The article provides information about project funding, main characteristics of CONTENTdm software, metadata development, and main advantages of the applied strategy and technology.⁵ Swain described application of CONTENTdm software as an alternative to development of in-house software for a fifty-image collection of the leaves from medieval manuscripts in the Rare Books and Special Collections of the University of South Carolina.⁶ Cospér provided update on the status of the project on migrating of an existing digital collection of 1600 images from an old software platform to the CONTENTdm platform at the Library and School of Arts and Humanities at the University of Alabama.⁷ One more example is the Indiana Memory digital library project, directed by Indiana State Library, which combined digital collections from several libraries when the CONTENTdm Multi-Site Server from OCLC was applied. This created an interface that allowed searching across all participating collections and provides access to these collections from outside servers.^{8,9}

It is important to indicate that CONTENTdm allows creation of not only digital image collections, but also collections of other media types, such as video and audio files, documents and reports, books,

and newspapers. Pillsbury described the Brubeck Oral History Project at the University of the Pacific in Stockton, California, a collection of online video clips with interviews, and discussed the history of the project, challenges and constructive solutions in presenting the video, audio, and graphic materials online, and CONTENTdm tools applied in the process of creating the collection.¹⁰

There are also examples of research on usability issues for end-users of CONTENTdm collections. Dickson summarized difficulties encountered by end-users, like confusion with the interface such as searching and browsing, difficulties finding existing collections and links to the collections from a library's webpage, problems with understanding search results, access to image editing toolbars, cross-collection searches, and others.¹¹

Digitization and Future Librarians

In the rapidly changing Web 2.0 environment libraries and librarians must adjust knowledge and qualifications to the needs of their users, follow development of trends, and learn to apply new technologies for the benefit of the users and the libraries. The ACRL Research Committee named as a first assumption among ten major assumptions that will influence development of academic libraries and librarians the "increased emphasis on digitizing collections, preserving digital archives, and improving methods of data storage and retrieval" and the "digitization of unique print collections may emerge as one of the primary missions of academic libraries in the 21st century".¹² Keeping in mind the opportunities arising in the area of digitization and increased demand for qualifications and skills connected to digitization and other new technologies, it is vital for future librarians to acquire theoretical and, most importantly, practical knowledge and skills in these areas.

The growing demand from libraries and information organizations for knowledge and application of digitization technologies for online presentation of their collections provides for increased interest of library school students to learn up-to-date digital technologies. Ma, Clegg and O'Brien presented research on digital library education with comprehensive literature review, online data analysis, curriculum of digital library teaching, demand for hiring digital librarians, and ways to teach about digital libraries.¹³ Isfandyari-Moghaddam, and Bayat provided a pro-

found insight into various publications on education of digital library specialists and digital library staff characteristics.¹⁴ After reviewing related publications, the authors developed a list of skills necessary for a contemporary digital library staff and presented a list of personal characteristics essential for the digital library staff.¹⁵ Gerolimos and Konsta gave an overview of the literature on professional qualifications and skills of a library and information field employees, and studied what credentials are required by the job ads in this field.¹⁶

The modern technologies and digitization processes are influencing all sides of academic library work. There are more digital units appearing in academic libraries and they require answers to many questions concerning staffing and professional development of employees. Questions have been raised about increasing workloads, digitization skills, cross-training, scheduling of these units and their specializations, and cooperation of the units with other library departments and their employees.¹⁷ The digitization process requires collaboration of professionals from libraries, information science, information technologies, administrative management, and other fields.

One essential characteristic of the current library environment is development of collaborative work of staff and close cooperation with specialists from the other involved institutions. Librarians, administrators, and IT specialists combine their efforts and qualifications working with different projects. "Working in teams to develop programs and services is becoming the norm in larger public libraries and academic libraries."¹⁸ Many publications on digital collection development using CONTENTdm emphasize the importance of collaborative work amongst specialists from different professional fields.¹⁹

The work of students in developing digital collections described in this paper included group meetings, e-mail and chat communications, and in-class presentations and discussions. These teamwork experiences are useful assets in future job activities and in working with others in real-world professional environments.

The current library and information environment requires that professionals working in this area have more in-depth knowledge about recently introduced digital technology applications and also to be able to obtain practical experience of its use for organization, presentation, and preservation of resources in a short period of time. This paper describes the LIS students'

learning process of the CONTENTdm application in a library and information science course, when students with introductory digital imaging experience and varied professional backgrounds worked on individual projects to create digital collections. It also looks at the main characteristics of the software from the point of view of the library and information science students learning to utilize the software for the first time in creating online collections.

Methodology

The paper provides an overview of the digital collection creation process using digital collection management software in a student group environment. From the numerous definitions of digital library management systems observed in the existing literature, for the use in this study we have chosen the definition offered by Weng and Mi saying that this type of system "provides mechanisms to launch, build, manage and access digital collections. It can be considered the public's gateway to the database. Its effectiveness not only directly affects the collection's current usage, but also may attract more potential users in the future."²⁰

It should be indicated that this paper does not reflect the thoughts and opinions of the class participants about the learning process or creation of the collections. In the class project described above, each student created his or her unique collection of fifty digital objects working independently and in parallel with the other class members under the instructor's guidance. Collecting and analyzing data about the training process for creating digital collections from the other class members could be a subject for future study of the process of mastering digital content management software in a student group environment. The current study is based on the authors' experience and observations. To collect data for the overview the authors assembled their own class notes, some class materials, and their correspondence.

For the purpose of this paper, it would be beneficial to present the goals and main characteristics of the class project discussed:

- The main project for the class was to build individual digital collections with appropriate metadata, indexing and search functions, and usability testing.
- The course goal was to help students gain an understanding of digital collections architecture, industry standards, design and content issues, and

controlled vocabularies, plus experience with digital archiving, and the planning and management of digital collections.

- CONTENTdm digital collection management software, which handles all digital assets, was used in creating unique collections under the instructor's guidance and in collaboration with all class members. This provided first-hand experience in digitization and collection building.
- Students discovered the capabilities of the software and learned to use its tools and wizards to import files and metadata and create compound objects.
- By starting with the first record and continuing through publishing the entire collection to be viewed and searched online, the students gained invaluable experience in a new software application and learning by doing.
- Among the technologies and equipment used for the projects were the following:
 - CONTENTdm digital collections management software by DiMeMa, Inc. - www.contentdm.com
 - Image editing software (Adobe Photoshop, MS Office Picture Manager, and others)
 - Microfilms
 - Microform reading equipment (Minolta MS6000 Microfilm copier)
 - Digital cameras and other photo equipment
- The project took place during an Advanced

Digital Imaging Management course at the UNT School of Library and Information Sciences from January to May of 2006

The paper explains factors contributing to the process of creating collections and developed descriptions of the stages of creating collections. The lessons learned section of the paper presents the authors' thoughts on recommendations for consideration in developing online digital collections with the use of the new technologies in a hands-on process.

Factors Contributing to the Learning Process

Software Instructions and Help Tools

At the beginning of the course, the students received handouts with information on how to create a new account with the CONTENTdm USC (User Support Center) and how to install and access workstation software. The students also received a printout of

the DiMeMa, Inc. tutorial titled "Building Your First Collection." Although the first document was somewhat helpful, the students still had problems with different stages of the process of installing and accessing the software. These problems were resolved with the help of the instructor. The second document gave a general overview about creating a project, importing files, entering metadata, uploading items, software administration, and troubleshooting. The 14-page document contained text and illustrations in the form of screenshots. This tutorial was used to some extent in the learning process, but it has to be indicated that it was not sufficient to use only the tutorial to solve many issues encountered in the development of each collection.

Instructor's Assistance

At all stages of the learning process, the students received instructor support during class meetings, through e-mails, and during personal consultation meetings.

Collections and Presentations of Class Members

Work on individual projects included two presentations. The purpose of the first was to inform the audience about the future collection. The students presented the collection topics, their structures, chosen thesaurus base, and information about existing problems and issues. At this stage, students also presented three collection objects ready and placed online. For the second (final) stage of the presentation the students presented their entire collections, giving descriptions of the metadata, demonstrating the collection, and explaining major tools used. Special attention was given to the unique features and characteristics of each collection.

As class members, the authors participated in both stages of the presentations as presenters and also as members of the audience. The role of presenter helped to organize the work process and prepare the collection for the first and second presentations. It also helped discover pros and cons of the software and make changes in the work process. The audience-member role provided knowledge on the experiences and findings of other group members on different issues related to the creation of collections. After the final presentation, the instructor distributed a short anonymous questionnaire for each presentation. These evaluations with audience comments were then

given to presenters to help them improve on presentation skills and revealed the strong and weak points observed for each collection.

Class members each had online user access to all collections of other members and could navigate through the collections to observe the collections' items, their features, metadata schemes, and other presentation tools used for the digital objects. This allowed students to exchange ideas and comments about the collections for the benefits of the learning process.

Discussions and Correspondence with the Group/Class Members

In the process of working on individual digital collections, students had access to several communication channels:

- E- mails, including group e-mails on digitization-related topics, collection development processes, software features and troubleshooting, and general organizational issues;
- Instant messaging and chat room communications;
- Meetings were held with group participants to discuss unclear issues in the use of CONTENTdm and other technologies and to exchange practical experience acquired during the learning process;
- Face-to-face meetings with the instructor to obtain assistance on different course topics. The meetings were held in a digital access lab with multiple computers loaded with CONTENTdm and other digital imaging software;
- Class discussions on various topics in digital imaging and collection development;
- In-class presentations on the process collection development.

In reference to the library and information science distance learning group environment, Kazmer named multiple benefits of the learning communities with the use of information and communication technologies, when the students “provide emotional support, work together, study together, and develop future professional networks” and also “get accustomed to using ICT [Information and Communication Technology] for communication”.²¹ These benefits of the communication process in the group work environment were observed in the course project discussed in this paper. Communication via e-mail and instant messaging complemented face-to-face discussions and in-class

presentations. Many students from the class stay in contact and include class members in their professional networks.

Other Collections Presented on the CONTENTdm Web Site

The opportunity to access and browse online through the many collections created with the use of CONTENTdm helped students look at the collections development process from the perspective of collection creators and also from the user perspective. It allowed students to become familiar with the overall interface, specialization of the collections, and their organization. Browsing through other collections presented online was also interesting and encouraging for the learners. They could see what they were learning to do and how the collections would look when presented online.

Individual Knowledge and Experience

As it was indicated before, the students in the course were at different stages of their graduate programs, holding undergraduate degrees from several majors. Some students in the group had library and information field experience from their jobs. Other students were getting their education to enter the profession and were working for other industries. The students had differing programs of study and research interests. Before this course, all the students had passed the Digital Imaging introductory course, and were familiar with digital imaging research literature and major digital imaging tools and applications. The differences in students' education, career, and spheres of interest greatly contributed to the variety of topics chosen for the collections and influenced ideas for organizing collections and their presentations.

Other Contributing Factors

For each individual collection, there were factors that contributed to the process of creating that particular collection. These additional factors presented themselves at different stages in the collection creation process. For several students there were conversations with friends and co-workers about their collections or topic ideas. For some there were other factors contributing to the development of the collection objects. For example in some collections which involved extensive scanning to prepare the collection objects, one of the contributing factors was help from staff of the uni-

versity library microform department. Some students borrowed objects for their collections or obtained images from other people.

One more important factor in this area is use of different information resources to create the collections, especially Internet resources. Information resources were used most frequently in the process of collecting materials and objects for collections and in the process of creating the thesaurus.

Stages of the Learning Process

Initiating the Collection

At this stage, the collection creators reviewed the project assignment and learned of the CONTENTdm application. They studied the handouts provided, software tutorials available online, and existing online collections. The participants started to develop ideas for individual collections, chose collection topics, confirmed topics with the instructor, and developed general content for the collections. Students also determined the source of collection objects and their format. Some collections were created using existing digital images; others generated new images through photography or scanning.

Preparing for Collection Creation

This stage included two major tasks:

- Develop outline and layout of the collections
This included more detailed development of the collection theme, its sections, topics, and content; presentation design for the objects, and grouping of individual objects into compound objects, if needed. This also included specifying the format of the digital images, their resolution, and size; determining the image processing software needed, and other technical characteristics and requirements for creating the collection objects. All specifications for the digital objects had to correlate with the software requirements. At this point, ways of storage had to be decided for the digital objects, along with details for their preservation and future archiving, keeping in mind the necessity to create backup versions of the images and other collection materials to protect the digitized information and to ensure its continuing availability.

- Assemble needed data and materials

This included research for information about the collection objects to be included in the image descriptions and ensuring access to needed software to edit images. Also, collection objects were combined and

the ones to be included in the collection chosen and photographed, if needed. Other supporting materials (music recording, text materials, etc.) were found and copyright issues were clarified.

Collection Creation

Two major tasks for this stage were:

- Preparing digital objects for uploading
This included the process of creating digital objects following the previously established standards (develop, copy, scan, photograph, record, etc.). The next step was editing the objects (image, audio, video, and text files) with the help of different software programs. After these steps, the objects (including simple and compound objects) were uploaded to CONTENTdm.

- Thesaurus and metadata

The theme for thesaurus and metadata elements was determined at this stage. The controlled vocabularies were customized depending on the collection subject and collection objects' characteristics with the purpose of facilitating future searches of the collection. The metadata (categories, fields, etc.) were organized using CONTENTdm templates.

Maintaining and Presentation of the Collection

After the collection objects were uploaded with the appropriate metadata, the maintaining of the collection could include editing of the metadata fields, changing the collection interface with the results screen view with the help of the CONTENTdm interface design tools. The individual collections were presented in class. As it was discussed earlier, the presentation process allowed students to exchange their experiences, gather information about discovered software tools, get comments and exchange ideas for further collections improvement.

Lessons Learned/Recommendations

- Practical training in application of the digital collection management software in the class group environment facilitated the process of learning through consultations with the instructor, discussions with classmates, exchange of ideas, findings, problems encountered, solutions to these problems, and presentation of the results
 - Access throughout the semester to the password protected software, both on in-class computers as well as from off-campus, was helpful in the learning process

- Online collections can be simple to complex
- For a first collection, consider choosing a simple topic; one where resources are plentiful and will be close at hand throughout the project
 - Tutorials are helpful, but the software does not need to be mastered before beginning. Go over the tutorials once and use the Help function for specific questions
 - Availability of other software for creating and editing collection objects was useful in the learning process
 - Previous work experience in digital imaging and knowledge of different digital image processing software was a very useful asset. The collection development requires lots of image editing, and first-hand fundamental knowledge and experience saves time and improves the quality of the collection objects
 - Already having images could help but the images and the metadata to these images have to be in the required format and be compatible with the CONTENTdm software
 - It is best to utilize word processing software first, so spell check can be done. The content can then be cut and pasted into the metadata fields
 - If there are many similar objects, make a general template for them and import multiple files all at once in a batch process
 - After uploading, files must be approved by the application's owner or manager. Files in pending status, awaiting approval, cannot be altered
 - Editing an approved collection is easy. "Find and Replace" is one of the most useful functions
 - Do not hesitate to ask classmates and instructors for help when there are questions
 - Student presentations during class help the learning process by exchanging experiences, ideas, and tips for using the software
 - After the collection is complete, be sure to make personal notes on how to use the main software tools or return to it from time to time to refresh the memory and keep previously acquired skills

One of the most important lessons learned was the overall experience of work with the digital collection management software and learning the new technology. With support of the instructor and the group, the students learned new technology applications and created their first digital collections online. They will be able to apply the acquired qualifications

in development of digital collections at the places of future employment upon graduation from the program.

Conclusion

The paper summarized the group learning experience when the students created digital collections for the first time using the digital collection management software, CONTENTdm. In the learning process, they practiced advanced digitization concepts and knowledge about industry standards. The students learned the main features of CONTENTdm software and practiced using these features. In the process of building collections the project participants created digital objects in different formats. They gained skills of metadata design, application of controlled vocabularies, and experience with indexing and categorization for digital searchable collections in content management systems. The paper identified and discussed the factors contributing to the process of training: software instructions and help tools; instructor's assistance; collections and presentations of the class members; discussions and correspondence with the group/class members; other collections presented on the CONTENTdm website; individual knowledge and experience; and other contributing factors. Main tasks were identified in carrying out the various stages of building digital collections. The stages included Stage of Initiating the Collection; Stage of Preparing for Collection Creation with two major tasks - develop outline and layout of the collections and assemble the needed data and materials; Stage of Collection Creation with two major tasks - preparing digital objects for uploading and organizing the thesaurus and metadata; and Stage of Maintaining and Presentation of the Collection. The paper provided recommendations that can contribute to improvement of the process of learning the new digital content management software to obtain up-to-date qualifications and skills in creating digital collections.

Future studies on this topic could include broader research of how students learn the digital content management systems in the group environment either in face-to-face, or blended, or distance learning courses. Data for the research and analysis could be collected with the help of survey and questionnaire tools distributed among the students taking the course. Further, the scale of the research might be enhanced by collecting data about the experiences of other collection creators who used CONTENTdm or

other digital content management software at other universities. The research could help to determine the accumulated findings, observed problems, and suggested recommendations of creators of the collections. The results could be applied in improving the learning process of the students at LIS schools in mastering the digital collection management technologies.

Acknowledgments

The authors would like to express their sincere appreciation to the course instructors, Dr. Samantha K. Hastings and Ms. Elise Lewis, for their tremendous support and professional guidance in the learning process and for their support of this study.

Notes

1. Gary Cleveland, "Digital Libraries: Definitions, Issues, and Challenges," *IFLA UDT Core Programme (March, 1999)*, available online from <http://www.ifla.org/VI/5/op/top8/udt-op8.pdf>. [Accessed 22 November 2008].
2. Laurie Lopatin, "Library Digitization Projects, Issues and Guidelines: A Survey of the Literature," *Library Hi Tech* 24, no. 2 (2006): 273-289.
3. Stephen M. Griffin, "Funding for Digital Libraries Research Past and Present," *D-Lib Magazine* 11, no.7/8 (2005), available online at <http://www.dlib.org/dlib/july05/griffin/07griffin.html>. [Accessed 22 November 2008].
4. Trevor J. Bond, "Visual Image Repositories at the Washington State University Libraries," *Library Hi Tech*, 22, no. 2 (2004): 198-208.
5. Kenning Arlitsch and Jeff Jonsson, "Aggregating Distributed Digital Collections in the Mountain West Digital Library with the CONTENTdm™ Multi-Site Server," *Library Hi Tech* 22, no. 2 (2005): 220-232.
6. Sara Swain, "University of South Carolina, CONTENTdm, and the Ege Leaves," *The Southeastern Librarian* 54, no. 1 (Spring 2006): 58-59. Otto F. Ege Manuscript Collection is available online from <http://digital.tcl.sc.edu/cdm4/browse.php?CISOROOT=%2FEMC>. [Accessed 17 December 2008]
7. Patricia Cosper, "To Share or Not to Share: CONTENTdm and the Mervyn H. Sterne Library," *Visual Resources Association Bulletin* 34, no. 3 (Fall 2007): 54-56.
8. Connie Rendfeld, "Indiana Memory: The Making of a Statewide Digital Library," *Indiana Libraries* 27, no. 2 (2008): 23-25. List of Indiana Memory collections by host institution is available online from <http://www.in.gov/memories/collections.html>. [Accessed 22 December 2008]
9. Marvin Allen and Kathy Allen, "Our Indiana Memory Project," *Indiana Libraries* 27, no. 3 (2008): 47-51. Starke County Historical Society Starke County Collection is available online from <http://cdm1819-1.cdmhost.com/cdm4/browse.php?CISOROOT=%2Fp181901coll014>. [Accessed 22 December 2008]
10. Glenn Pillsbury, "Behind the Brubeck Oral History Project," *Society for American Music Bulletin* 34, no. 1 (2008): 12-13. The Brubeck collection is available online from <http://library.pacific.edu/ha/digital/index.asp>. [Accessed 20 December 2008]
11. Maggie Dickson, "CONTENTdm Digital Collection Management Software and End-Use Efficacy," *Journal of Web Librarianship* 2, no. 2-3 (2008): 339-379.
12. James L. Mullins, Frank R. Allen, and Jon R. Hufford, "Top Ten Assumptions for the Future of Academic Libraries and Librarians," *College & Research Libraries News* 68, no. 4 (2007): 240-241, 246.
13. Yongqing Ma, Warwick Clegg, and Ann O'Brien, "Digital Library Education: the Current Status," Opening Information Horizons: *Proceedings of the 6th ACM/IEEE-CS Joint Conference on Digital Libraries, June 11-15, 2006, Chapel Hill, North Carolina*, 165 - 174.
14. Alireza Isfandyari-Moghaddam and Behrooz Bayat, "Digital Libraries in the Mirror of the Literature: Issues and Considerations," *The Electronic Library* 26, no. 6 (2008): 844-862.
15. Ibid.
16. Michalis Gerolimos, and Rania Konsta, "Librarians' Skills and Qualifications in a Modern Informational Environment," *Library Management* 29, no. 8/9 (2008): 691-699.
17. Carla Stoffle, Barbara Allen, and David Morden, "Continuing to Build the Future: Academic Libraries and Their Challenges," *Portal: Libraries and the Academy* 3, no. 3 (2003): 363-380.
18. Linda W. Braun, "New Roles: A Librarian by Any Name," *Library Journal* 127, no. 2 (2002): 46-49.
19. Cosper, "To Share or Not to Share," 54-56; Swain, "University of South Carolina," 58-59; Rendfeld, "Indiana Memory," 23-25; Bond, "Visual Image Repositories," 198-208; Pillsbury, "Behind the Brubeck," 12-13.
20. Cathy Weng and Jia Mi, "Towards Accessibility to Digital Cultural Materials: a FRBRised Approach," *OCLC Systems and Services* 22, no. 3 (2006): 217-232.
21. Michelle M. Kazmer, "Community-Embedded Learning," *Library Quarterly* 75, no. 2, (2005): 190-212.