«E-content management of archives for lifelong learning: The interaction between the 'student' and the 'educational provider'»

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Abstract

In the digital era the archival sector *("the educational provider")* sees a spectrum of e-learning user types emerging, ranging from the inexperienced, novice user, to the highly proficient and advanced user of digital resources *("the student")*. In the archival domain investing on knowledge management by providing a user-friendly e-learning conceptual environment can be viewed as a process. The target is to support lifelong learners by putting the learner at the heart of the system and to succeed social innovation over technological invention. The first section of the paper discusses the conceptualization of the interactivity between the educational provider and the student in the lifelong learning process. The second part analyses –from the educational perspective- the "conceptual leap" needed to preserve archival information in the knowledge era.

Keywords: lifelong learning, knowledge management, archival innovation

1. Introduction

New information technologies are catalysts of change, both social and political; and perhaps nowhere more so than in the area of culture. The stuff of culture—the production of ideas, meanings, identities, and narratives, as concepts of common memory—has always been inseparable from the possibilities and constraints of the dominant technological media. New information technologies, from the printing press to the Internet to the semantic web, have always been engines of cultural innovation—keys to reshaping creative possibilities, notions of self and community, cultural institutions, and the roles of cultural actors.

The array of technological, social and political conditions is transforming the way scientific and societal knowledge is produced and also disseminated in archival institutions. The emergence of collaborative technologies, the shifting influence of non-academic versus academic organizations and private versus public investments are challenging archives, as traditional cultural agents of education and research. To understand this new knowledge ecology, archives coordinate research on new models of organizational collaboration, emerging fields of research and changing forms of scholarship, transformations of education, transitions to institutions, and innovative programs in interdisciplinary and integrative learning.

For the archival sector, where users are the most important assets, is critical to adopt a social policy in managing knowledge for lifelong learning purposes; thus, to evolve users' skills, capabilities, interests and experience. "Knowledge" here means how technologies change the ways users think about their archives, their collective memory and identity. Knowledge also refers to how archivists, as professionals, organize, access and use information--indeed, how they transform primitive historical information into knowledge within the digital framework. "Social policy" refers to what archivists, should do about these things (if anything) both as individuals- information management expertises, and as governments- public sectors representing national heritage within the global environment. "Lifelong learning" is a core element of this strategy, central not only to competitiveness and employability but also to social inclusion and cohesion, active citizenship and personal development. It enables all persons to acquire the necessary knowledge to take part as active citizens in the knowledge society and the labour market (Lisbon European Council 2000).

Archival institutions benefit from digital applications in a number of ways. They use computer technologies to secure accessibility of their resources for the future (i.e. long-term preservation of complex digital collections); to reach out to special target groups (e.g. youngsters, people living in disadvantaged areas, people with access disabilities); to enhance their educational services (e.g. by developing on-line material for formal and informal educational purposes); and, to improve access to their holdings, both quantitavely (i.e. by making their resources more widely accessible, that is *information*) and qualitatively (i.e. by providing meaningful, conceptualized resources that relate to people's lives, by encouraging users' interaction, that is *knowledge*).

Undoubtedly, in recent years the shift in the scope of Information Technology Systems (ITS) from the information-based focus (=Information Management) toward the knowledge-based focus (=Knowledge Management) highlighted the importance of the archival domain and the need to manage archival sources including competencies. Knowledge management, as a concept with people taking the centre stage, has prompted archivists, as information professionals, to rethink information management and focus from trying to improve intelligent systems to developing tools for intelligent people (McKay 2003).

2. Conceptualizing interactivity for lifelong learning

Archives play a vital role in enabling communities to access lifelong learning opportunities through offering access, professional guidance and training to global resources in a local setting (Eduards and Usher 2000). They provide a wide range of services to millions of students, researchers and members of the public, as well as access to a huge range of high quality raw content. The conventional functions of an archival organization are to collect, process, disseminate, store and utilize document information to provide service for the society. **Archival institutions** provide access to

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collections of unpublished materials -in the form of a "document"- about the past and a wide framework of topics related to the past. These collections include manuscripts, letters, diaries, organization records, state and local government records, photographs, films, oral histories and many other kinds of unique materials documenting the concept of collective memory (Buckland, 1997).

The rapid changes and applications of Semantic Web in the means of archival access have spawned an upheaval in describing and managing archival resources. They have added valuably to the arsenal of tools used for educating the public but also for interpretation and research by experts in the fields of education and cultural heritage. In parallel, these advanced technologies have potentially contributed to an increasing awareness that knowledge can be extracted by the users via the developments of "user-friendly" metaphors in human-computer interaction; they have facilitated the acceptance of "interactivity" as one of the key elements of digital media in the archival domain (Gilliland-Swetland, 2000).

It is this realization that makes knowledge management attractive to archival organizations. While the focus in information management is mostly on explicit knowledge, knowledge management brings a new dimension: the need to manage semantic knowledge by focusing on people and enhance their capability by improving communication, information transfer and collaboration. Facilitating interactivity and conceptualizing it in the lifelong learning framework requires (Kourtoumi 2004):

- discovery of existing knowledge (archival description)
- acquisition of knowledge (indexes and inventories)
- creation of new knowledge (schemas, ontologies)
- storage and organization of knowledge (metadata)
- sharing of knowledge (public access, user-frienldy systems)
- use and application of knowledge (learning environment)
- feedback (educational programs, course packs)

The identification of knowledge needs of the users is based on the principles of lifelong learning, the basic stages of which are:

- information (discovery of existing knowledge)
- tacit knowledge (acquisition of knowledge)
- understanding (creation of new knowledge)
- application (storage and organization of knowledge)
- analysis (sharing of knowledge)
- synthesis (use and application of knowledge)
- evaluation (feedback and digital libraries)

The core philosophy of the lifelong learning process is the discovery of knowledge, not the passive reception of information. It is a condition of constant apprenticeship-mobile, flexible and adaptable (Ainley and Rainbird, 1999). In all stages archives are

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used as a dictionary, a databank, a thesaurus or a quilt index. In all dimensions they work as a comprehensive, (trans-) institutional online collection tool built upon an open source digital repository: the user opens it every time he or she needs to find out something and comes back to it when he or she needs it again (Kourtoumi, 2008).

In the archival domain investing on knowledge management by providing a user-friendly e-learning conceptual environment, can be viewed as a process. In this process the target is to optimise the effective application of intellectual capital to achieve organizational objectives: to maximize effectiveness and efficiency of archival institutions in the global environment (Bouthillier & Shearer 2002). The challenge in lifelong learning is to discover and capture the tacit intellectual capital - that contained in the primary sources- in order for archives to enable the general public to "construct" its learning:

- by sharing their capital through world-wide connectivity and interoperability, to leverage corporate capital
- by encompassing learning for personal, civic and social purposes as well as for employment-related purposes

3. Making the "conceptual leap" to preserve archival information

As Carl Smith noted in the American Historical Association's newsletter, many web sites "seduce the senses without engaging the mind" (Smith 1998). In the digital era the archival sector sees a spectrum of e-learning user types emerging, ranging from the inexperienced, novice user, to the highly proficient and advanced user of digital resources. In the archival environment digitisation includes taking a physical object or analogue item, such as a tape recording, a map, or correspondence, from a collection that is rare or unique, often extremely fragile, and taking photographs of the item, and transferring the photographs to a digital medium. The negatives or prints are scanned into digital format (Library of Congress 2000). Digital files are imported into, and managed with the use of software programs. Digital files may be read, compressed, transferred and retrieved over computer networks then made accessible and viewed on computer monitors (=digital libraries).

The focus lately is moving from creating large amounts of digital content and providing some fairly simple access tools, upon constructing sophisticated systems for ongoing use or apparatus providing interpretation. All of these efforts are producing numerous large collections of material, databases that are open to exploration and presentation in dozens of different directions (Oluic-Vukovic, 2001). While digitising and making available collections through the Internet has been a laudatory goal for archives, there is still a evolving need to push this accessibility further to more deeply engage users with the rich historical sources that the database would highlight, exploiting the pedagogical and interactive possibilities of the medium. Although many archival institutions have embraced digital archives to make

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their collections more accessible to support learning as a social experience, few have joined in multi–state efforts to combine resources concerning a specific topic to explore the medium's pedagogic potential (Mercier and Wykoff, 2005).

However, the end product is determined by how well these functions are performed. Here, the concept of *digital collection* comes. It is needed to make a "conceptual leap" in order to preserve information in the digital age. It is the informational content that must be preserved. The problem lies in the fact that the content may now be completely removed from the physical artifact (Besser, 2002). It will take a conscious effort to make sure that the digital content information survives.

In the conceptual leap of constructing digital collections for archives metadata is the first line of defence to protect digital information and content. The target is to support lifelong learners by putting the learner at the heart of the system and to succeed social innovation over technological invention. By providing detailed metadata, archival institutions may minimize the risks of digital resources becoming inaccessible in the future. Important unique technical information may be captured including: scanning specifications, operating systems, software versions, and decompression schemes (Beagrie and Greenstein, 2001).

In addition to the institutional administrative data, it is important to maintain the digital integrity of the files (Beamsley, 1999). For example, the significance of an archival collection is heavily based on its provenance or the context in which it was created. Consequently, the nature of archival description in the digital form must incorporate this focus. The ramifications for digital cataloguing under the "conceptual scope" (=metadata and ontologies) are the overwhelming need for notes that provide the context such as biographical or historical notes concerning the creating person or body, as well as extensive content and scope notes. However, the *authorship* concept can at times be somewhat difficult to discern due to the principle of provenance, that is, the person or body who actually physically produced an item may not be as significant as the body within which it has context. Also it is often a matter of some debate in constructing digital as to how to categorize the writer of a letter for instance, either as an *author* (who) or if they write about themselves within that letter as a *subject* (what). How an entity is digital catalogued can have ramifications on how it will be found, that is, what kind of electronic search will retrieve that entry.

The depth and manner in which a collection/a file and/or a document are catalogued have consequences for its ability to be retrieved by a potential user. Given the problems of addressing the needs of a diverse audience, it might seem that comprehensive cataloguing is the answer, however this is a very time- intensive and

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ultimately costly process. It becomes clear then that there is a huge problem in describing the full possible subject content of a collection/ a file and/or a document and the many meanings and potential uses it might have to various users. A digital index that captures this full range of possibilities would be impossibly costly and labour-intensive to build internally. One approach to developing such an index might be to permit the actual users of the images to add their own keywords, annotations, or notes on the ways they have used it.

In the semantic age, then, archives become a treasure house of human knowledge worldwide, participate in knowledge innovation (*knowledge-building, knowledge representation and knowledge management*) and become an important link in the knowledge innovation chain.

Type	Definition	Examples
Administrative	Metadata used in managing and administering information resources	- Acquisition information - Rights and reproduction tracking - Documentation of legal access requirements - Location information - Selection criteria for digitization - Version control and differentiation between similar information objects - Audit trails created by recordkeeping systems
Descriptive	Metadata used to describe or identify information resources	- Cataloging records - Finding aids - Specialized indexes - Hyperlinked relationships between resources - Annotations by users - Metadata for recordkeeping systems generated by records creators
Preservation	Metadata related to the preservation management of information resources	- Documentation of physical condition of resources - Documentation of actions taken to preserve physical and digital versions of resources, e.g., data refreshing and migration
Technical	Metadata related to how a system functions or metadata behave	- Hardware and software documentation - Digitization information, e.g., formats, compression ratios, scaling routines - Tracking of system response times - Authentication and security data, e.g., encryption keys, passwords
Use	Metadata related to the level and type of use of information resources	- Exhibit records - Use and user tracking - Content re-use and multi-versioning information

***Picture 1**. Different Types of Metadata and Their Functions (Source: Gilliland-Swetland, 2000)*

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4. Establishing infrastructure to facilitate experimentation

Knowledge based e-learning has already become central to the creation of the intellectual capacity on which archival knowledge production and utilisation depend. Archival institutions have to promote lifelong-learning practices and update knowledge and skills if they are to retain competitive advantage. As traditional institutions of primitive historical information they have an important role to play in this regard, by underpinning learning in its broadest sense, both as a formal activity within an institution and informally within the community. They have to take advantage of the opportunities offered by the new information and communications technologies. Failure to do so will mean the widening of the digital divide that is facing most of the developing countries, particularly the low-income countries (EBLIDA, 2001).

By creating digital surrogates of their collections on a semantic scope, archival institutions continue to support the notion that there is value in the materials they house in a global environment. However, research in scale-up is very difficult to perform except by building and deploying a large-scale digital (knowledge-based) collection system. Establishing infrastructure and tools to facilitate experimentation with large-scale systems is essential, as is funding to study use and behaviour of large-scale systems once deployed through this infrastructure.

Applying such infrastructure and tools in archival sources is valuable for creating learning materials and learning scenarios. Archival knowledge is then directly introducing into the lifelong learning processes at all level in arts, humanities, science and vocational courses. These learning environment focus primarily on older and historic manmade structures and environments, promoting their use in curriculum as visual resources for teaching knowledge and skills; as resources for the study of a continuum of cultures; and as real and actual places that users of all ages can experience, study and evaluate first hand (Coleman, 1988).

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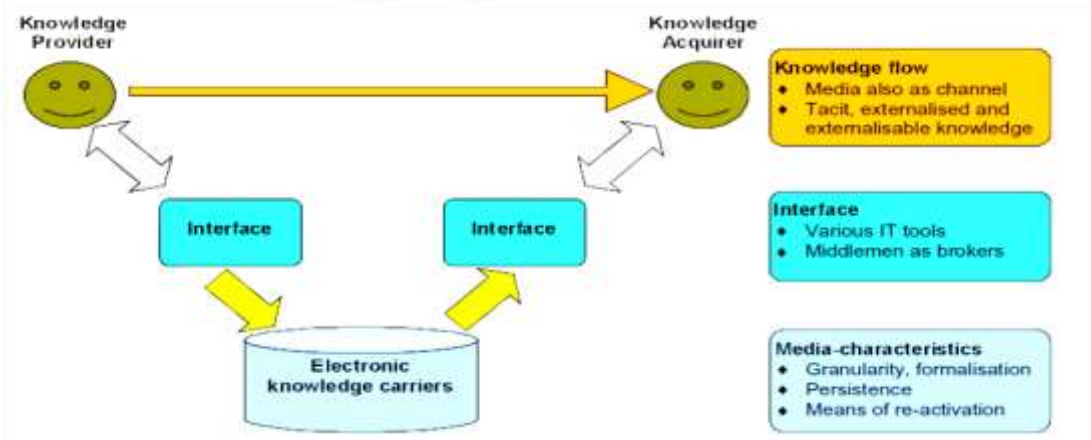

***Picture 2**. Creation and sharing of constructed knowledge*

The essence of the digital collections approach is to enable access to web-accessible material through interoperable repositories for metadata sharing, publishing and archiving ("Open Archives Approach") (Hepburn 2004). It arise out the archival community, where a growing need for low-barrier interoperability solution to access fairly heterogeneous repositories of raw historical information lead to the establishment and promotion of interoperability standards that aim to facilitate the efficient dissemination of archival content.

Once a workable schema is in place, the next task is to enable users to provide input in the system. It is seen vital that the capture of knowledge has to happen within the domain that the users are focusing on (highly contextual), and represent that context correctly to others. As a consequence, specific forms of users' innovation are evolving (Houle 1961):

- Goal -orientated innovations- for those users who use education as a means of accomplishing fairly clear cut objectives.
- Activity -orientated innovations- for those users who take part in such activities because of an attraction in the circumstances of learning rather than in the content or announced purpose.
- Learning -orientated innovations- for those users who seem to seek knowledge for their own sake

Principally, two types of knowledge need to be captured. The first is as an annotation to existing content. The techniques of annotation have been found useful to retain context while avoiding unnecessary changes in the original knowledge object. On-line news bulletins, allow discussion treads, user feedback and user ratings directly attached to the "document". Secondly, new content needs to be added to the

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knowledge base. To maintain the integrity of the knowledge base, only users with suitable access rights should be able to add this level of content, or additions need to be moderated and accepted prior to addition in the knowledge base (Verhaart, 2003).

The final part of the content management system is the ability to reorganize the domain content for use in different lifelong learning situations. At this level it will be important that the annotations and any new or additional content are flagged so that any anomalies or updated content can be added to this reorganized taxonomy.

5. Conclusions

In the knowledge era archives attempt to share their collections by digitizing and indexing them on the web. Since knowledge is recognized as an essential asset for archives to survive on increasingly competitive and global environment, knowledge management has become an important effort in many archival organizations. Within the education paradigm of lifelong learning and by encouraging the general public to share their discoveries and engage in more sophisticated use and analysis of archives, the application of semantic web change the way that "documents" as educational materials are designed, developed and distributed. It also changes the roles that the "student" (the user) and the "educational provider" (the archival institution) play and the interaction between these "players" in the educational setting.

Digital archival collections need to be considered from the vantage point of the content and functionality they are providing as well as the context of the activities they are intended to support. As complex resources are designed and developed for education in particular, careful research on how archival users learn using such resources should inform the construction of these digital collections. If such pedagogically structured resources are made available, users will learn how to decipher, judge, apply, and learn from these digital collections. In terms of significant lifelong learning, such knowledge will serve the users well.

Meanwhile, archival institutions invest in digital projects within the semantic scope by carefully designing metadata results for lifelong purposes, including:

- reducing over-handling of material in order to preserve it (diagnosing learning needs)
- assisting in promoting the collections and the institution in a global environment (formulating learning needs)
- providing intellectually access to value-added information (identifying human material resources for learning)
- achieving the best information and knowledge management of their material in the short and long-term (choosing and implementing appropriate learning strategies and evaluating learning outcomes)

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