Community Dimensions of Learning Object Repositories

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ABSTRACT
This paper outlines some enablers and barriers in the use of learning object repositories (LORs) to support learning within a range of communities. Key dimensions of use of LORs as well as relationships between LORs and the learning communities that they aim to support are discussed. The LORs and communities analysed in the paper are SIESWE Learning Exchange (formerly Stor Curam), JORUM, IVIMEDS, and DIDET. Guided by the Activity Theory perspective, the LORs and the communities are analysed as sociocultural activity systems. Based on this analysis, some initial barriers and enablers for the use of LORs to support learning are outlined and implications for the future use of LORs are discussed.

Keywords
Learning object repositories, communities, Activity Theory

INTRODUCTION
This paper discusses some initial ideas and findings arising from the 'Community Dimensions of Learning Object Repositories' (CD-LOR) project. This initiative is funded by the UK Joint Information Systems Committee (JISC) to investigate enablers and barriers to successful use of learning object repositories (LORs) to support learning within a diverse range of communities. The CD-LOR is particularly focusing on the social, organisational, and cultural dimensions of the uptake and use of LORs. Although the CD-LOR collaborates with about 25 LORs, the initial analysis reported in this paper is limited to only four of these, namely the SIESWE Learning Exchange (formerly known as Stor Curam), JORUM, IVIMEDS, and DIDET. The paper aims to address the following questions:

1. What are the different types and dimensions of communities that use LORs?
2. How can LORs be used to support learning within communities?
   - 2.1. What are the key dimensions of the LORs?
   - 2.2. What are the general issues in use of LORs?
3. What conceptual framework can be useful in investigating the use of LORs to support learning within communities?
4. How communities use four specific LORs?
   - 4.1. How the LORs and the communities that use them can be analysed as activity systems?
   - 4.2. What might the gaps/contradictions be between the activity systems of the LORs and the communities?
5. What are the implications of these contradictions for the uptake and use of LORs to support learning within communities?

LEARNING OBJECT REPOSITORIES AND COMMUNITIES

Rapid developments in the use and reuse of digital learning resources, or 'learning objects', have led to a marked increase in the number and range of learning object repositories. Generally, these repositories are implemented to support the learning needs of one or more communities. This study is based on the hypothesis that issues that are likely to impact upon the successful functioning of a repository are directly related to key factors of the community or communities it aims to serve. The underlying premise is that the way a repository is used is likely to depend upon the nature of the community and how it is organised.

There are a range of key factors that are likely to influence the ways in which communities might use learning object repositories. These include the size of the community and spatial location of members; community ground rules, roles, relationships and control; motivational factors such as rewards and incentives; whether the community is tightly knit with members having close connections or transient and conditional. The issues that inhibit sharing and reuse of learning resources will differ between communities, although some will also be common across learning communities. Consequently key factors that influence LO repository utilisation may differ between one community and another, although some will be generic across learning communities, and across the wider repository problem space encompassing such related initiatives (for example e-Print archives, image databases, research databanks, etc.).

Potentially there are a range of different types of communities that might use a learning object repository. These include learning communities, communities of practice, hobby communities or research communities. This study focuses in particular on communities of practice - "groups of practitioners in a shared field of expertise who share knowledge and experience" (Koper et al., 2004, p. 24) - and learning communities – communities in which members share "…a consensual goal to support each other in learning" (Wilson & Ryder, n.d, p. 1), in addition to sharing knowledge and experience.

The communities included within this study use a variety of LORs that may be characterised by a number of key dimensions such as subject discipline, educational sector (such as Further or Higher Education), geographic range (classroom-based, national or international), purpose of the community and the contributor. Most of the repositories within this study are based upon one or more of these dimensions. For example, IVIMEDS can be viewed as an international repository based around a single-subject discipline (medicine), whereas the JORUM repository could be described as national, cross-sector. It is important to question whether the user groups of these learning object repositories can be described as communities at all.

Wenger (1998) defines communities as having shared goals, shared tasks and negotiated interactions. Can the groups of users of LORs really be defined as "communities" in the Wengerian meaning of the term? Can viable communities be created around tools such as LORs at all? Could such communities construct viable knowledge through LOR-mediated dialogue? Although sharing and exchange of learning objects is a precondition for knowledge construction, it does not in itself constitute knowledge construction.

LEARNING OBJECT REPOSITORIES IN SUPPORT OF LEARNING

Learning object repositories, as many other learning technology innovations, have often "seemed to be designed to exploit the capabilities of the technology rather than to meet a [learning] need" (Koschmann, 1996, p. 83). This focus on technology has resulted in an overemphasis on issues such as interoperability standards and specifications, levels of granularity and aggregation of learning objects, resource description, discovery and delivery. A number of pedagogical, social, and organisational factors have largely been ignored in the design and research of LORs. Firstly, current educational theories characterise learning as either constructive, self-regulated, goal-oriented, situated and/or collaborative. Therefore, if LORs are to support learning, they should be designed as environments that enable collective, participatory process of active knowledge construction, reconstruction and reuse. Secondly, Dobson, LeBlanc & Burgoyne (2004) argue that ignoring social and organisational factors while designing LORs often results in"…poor matches with users' needs, misalignment with change policies and plans, confusion of roles and responsibilities in practice, and as a consequence, often very poor levels of technology uptake and use" (p. 2). Thirdly, the main focus of research surrounding learning object repositories has been on the management of digital learning resources, rather that on how repositories might be used to support a diverse range of educational

models. While initially the debate focused primarily on the technological feasibility of LORs, recently there has been a shift towards the identification and analysis of "the factors that influence the practical uptake and implementation of learning objects" (Campbell, 2003, p.36).

The range of issues in the uptake and use of LORs in support of learning discussed in the literature can be grouped into four broad categories (Littlejohn, Nicol, & Margaryan, in preparation) – socio-cultural, educational, organisational and information management, and technological issues. These groups of issues are not distinct but have a complex interplay. For example, pedagogic issues have associated technological and socio-cultural dimensions; and the information management issues are closely connected with the technological issues.

The way the LORs are currently used to support learning range from passive sourcing of information objects to active creation, sharing, and management of resources. Examples of this continuum are illustrated in Figure 1 below:

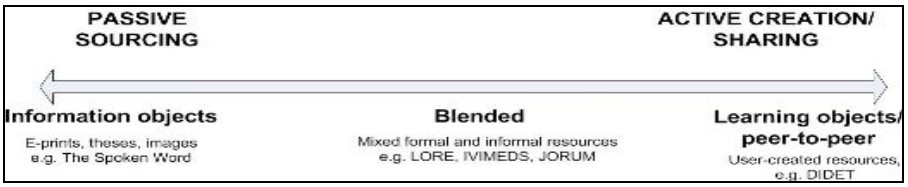

Figure 1. Current use of LORs to support learning

In the next section a conceptual framework for analysing the use of LORs to support learning in communities will be described.

ACTIVITY THEORY FRAMEWORK FOR ANALYSING LORS AND COMMUNITIES

Activity Theory is a useful starting point to investigate the LORs and communities that use them. This theory offers a method of analysing the development of LORs as participatory environments where knowledge is co-constructed rather than 'exchanged' or 'consumed'.

Activity Theory (AT) (Engestroem, 1987) is one of a number of socio-cultural approaches to learning, that comprise a range of theories including those originating from the Soviet school of psychology (Leontiev, 1978; Vygotsky, 1978); cognitive-social theories (Bandura, 1977); situated learning theories (Lave, 1997); and communities of practice approaches to learning (Wenger, 1998). These theories emphasise the importance of social and cultural contexts in learning. Within these theories learning is viewed as an expanding engagement with a social practice, rather than as the acquisition of knowledge or as the transfer of cognitive skills. Thus learning is viewed as located in collective practice rather than in individuals; individuals construct knowledge needed to achieve their learning goals by accessing it socially.

In analysing the LORs and the communities where LORs are used to support learning, it is useful to build on the three main assumptions of the AT: 1) social origin of learning; 2) mediation of (learning) activity by tools; and 3) purposive nature of activity. The first assumption is that cognition is socially distributed rather than located in an individual; thus knowledge is socially created and re-created in practice – Leontiev (1978) calls this "co-knowing". The implication for the LORs is that if they are to support learning processes within communities, it is this kind of social interactions and co-creation of knowledge that they should facilitate. LOR models thus should move beyond delivery of digital assets and information resources, and focus on resources (collaboratively) created by users in the course of learning activities. This assumption also implies that in designing LORs, different trajectories of interactions within the communities should be considered; for example, Gifford and Enyedy (1999) mention the importance of considering "the sociogenesis of cultural practice, the ontogenesis of people within practice, and the microgenesis of ways of participating within that cultural practice" (p. 5)

The second assumption is that the social creation and recreation of knowledge is facilitated through tools. Just as activity is contextual, tools can also be understood only in context of activity: how they are used, what needs they serve, and how they were developed. LORs can be viewed as a part of the repertoire of tools that communities use to reach learning goals. It has been argued that tools can fundamentally change

the nature of activity and can lead to creation of new types of activities (Jonassen & Rohrer-Murphy, 1999). The relationship between tools and activities is dialectic, in that tools are also changed by the ways in which they have been used. The implication is that as the way in which communities use the LORs changes over time, the activities of teaching and learning within the communities are transformed as well. LORs can change the learning processes, and at the same time be changed by the learning processes. However, communities also use other tools, both physical and conceptual – such as information management tools and strategies, learning resources, pedagogical theories, mental models - which have to be considered and re-thought in relation to the LORs when the latter are designed and implemented.

The third principle of the AT relates to the assumption that learning activities are not only situated in a social context, but are also driven by learners' goals and motives. Therefore activities are outcome-oriented. Motivation and goal-formulation are inherently social. They are influenced by prior experiences, interpretation of the expectations of others, and identification of the strategic purpose and value of personal actions. Leontiev (1981) agued that an activity can be analysed at three levels. The first level relates to the overall motive for engaging with an activity. The second level, at a lower level of granularity, relates to the actions that constitute an activity that are governed by (short-term) goals. The third and most granular level of activity relates to the operations necessary for carrying out the actions.

In order to use LORs effectively to support learning within communities, the design of each repository should be guided by an understanding of the learning goals of these communities and the activities that they engage in. This three-level hierarchical activity structure could be a useful way of approaching the issue of granularity of resources within the LORs, as well as for structuring the resources. For example the types of resources that are required to support learning actions where conceptual, "know what" type of knowledge is used could be different from the resources that would be required to support operations, where procedural, "know how" type of knowledge is used.

An important AT construct relevant to the analysis of LORs and communities is that of activity systems (Engestroem, 1987). Activity systems are sociocultural settings where groups of community members have a shared goal (but often different motives) and object and a shared set of tools to act on the object to realise the goal; this mediated action is being conditioned by implicit and explicit rules; a broader community where the activity takes place; and involves division of labour among the actors in the community. When the communities interact with tools or artefacts (e.g. LORs) on some object (e.g. learning tasks) with a shared goal and desired outcome (e.g. co-construction of knowledge, improved learning), their interactions can be analysed as an activity system. These relationships are shown in Figure 2:

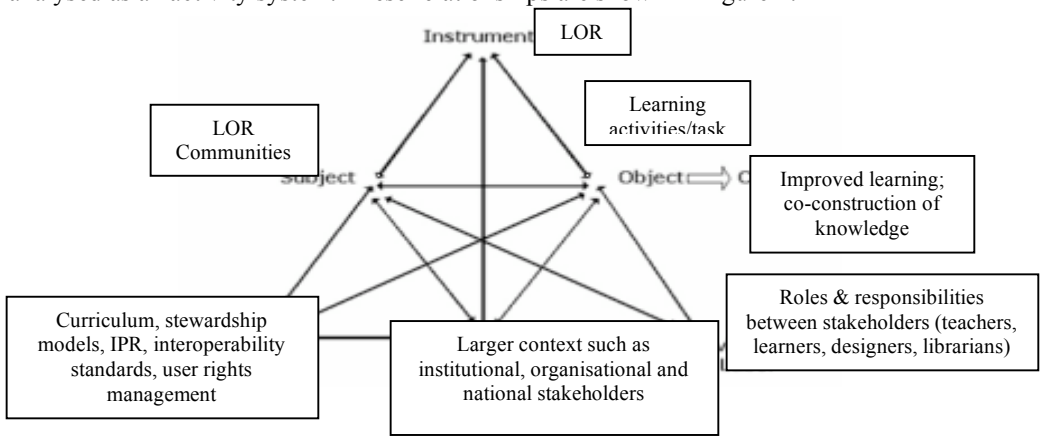

Figure 2. An activity system of a LOR community

Thus the AT could provide a holistic framework to study LORs and communities as systems, rather than as loose sets of actors, tasks and purposes. AT is not a prescriptive theory, but provides an analytic lens to understand the priorities and interactions of goals, the affordances of LORs, their interrelationship with

rules and roles within the communities, and the implications of introducing new tools and approaches associated with learning objects for learning and teaching. In the next section, four specific LORs and communities will be analysed as activity systems; they will further be compared in order to elicit potential gaps between these systems that can impact the use of LORs to support learning.

LORS AND COMMUNITIES AS ACTIVITY SYSTEMS

A key question is: how are four specific LORs – SIESWE Learning Exchange, JORUM, IVIMEDS and DIDET – used by communities to support learning? In order to answer this question, the AT framework is used to analyse these LORs and the communities that use them as activity systems; subsequently these activity systems are compared to identify the gaps that can impact the implementation of LORs.

SIESWE Learning Exchange, JORUM, IVIMEDS and DIDET as activity systems

The analysis presented below is based on the outcomes of an initial scoping exercise. Data collected from the curators of the four LORs focused on the following aspects of the LORs: stated purpose; (expected) users; types of resources contained in the LOR; how the LOR is used; geographic range covered; disciplines covered; educational sector served; organisation of the communities; creators of the resources; how the resources are managed. These data are supplemented by interviews with a sample of end-users of the repositories. At the time of writing the paper the data collection was not complete, therefore the mapping of LORs outlined below is based on the curators' perspective only. The findings from the user data analysis will be presented at the conference.

SIESWE Learning Exchange ***http://www.sieswe.org/learnx/about.html***

The purpose of this LOR is to support and enhance the learning of people involved in social work and social care education through the provision and development of a repository of digital learning materials. It is targeted at Scottish social work educators and learners in institutions of higher education (HE), further education (FE) colleges and social work agencies. The mapping of the SIESWE Learning Exchange as an activity system is shown in Figure 3:

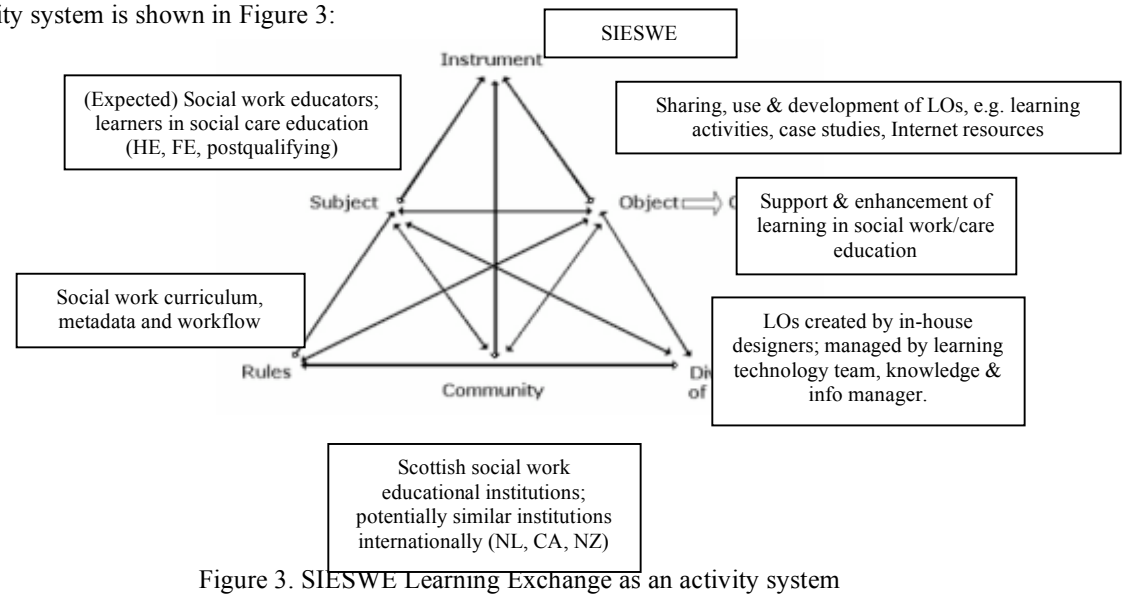

Figure 3. SIESWE Learning Exchange as an activity system

JORUM ***http://www.jorum.ac.uk/***

JORUM is a collaborative venture in the UK Further and Higher Education to collect and share learning and teaching materials, allowing their reuse and repurposing. JORUM is an interdisciplinary repository and is available to teaching and support staff. The mapping of the JORUM as an activity system is shown in Figure 4:

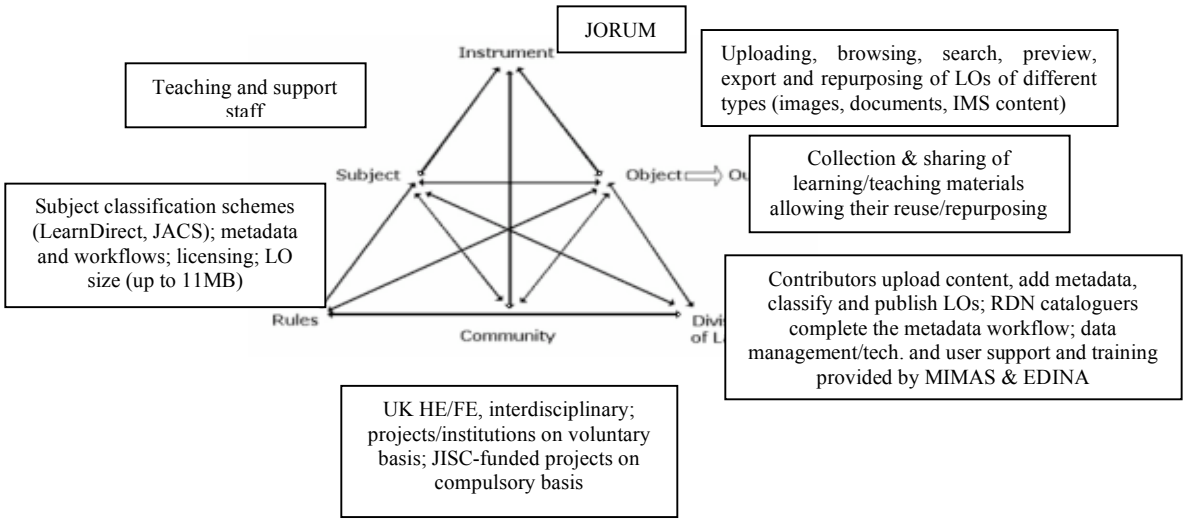

Figure 4. JORUM as an activity system

IVIMEDS ***http://www.ivimeds.org/newshowcase/***

The purpose of this international repository is to enable partner institutions to share learning resources with a view to making medical education more effective and efficient. The mapping of IVIMEDS as an activity system is shown in Figure 5:

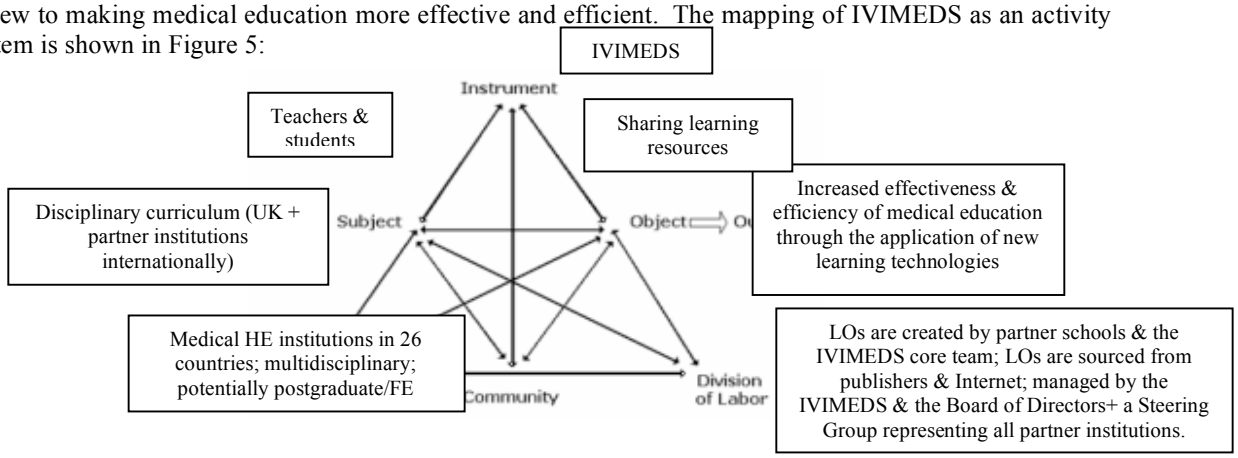

Figure 5. IVIMEDS as an activity system

DIDET ***http://dmem1.ds.strath.ac.uk/didet/***

The goal of the LOR is to enhance student learning opportunities by enabling them to partake in global, team-based design engineering projects. The mapping of the DIDET as an activity system is shown in Figure 6:

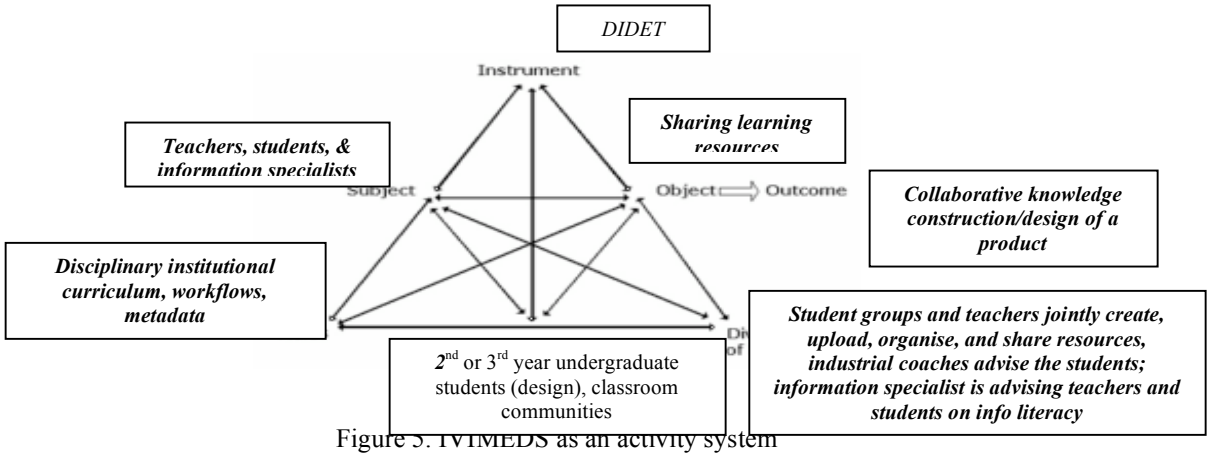

Figure 3. IVIMEDS as an activity system

Contradictions between the activity systems of LORs and communities

One of the key concepts of the AT is the notion of "contradictions" (Engestroem, 1987). Contradiction is the mismatch within and between the elements of the system. In this section the activity systems of LORs and communities will be compared in order to elicit the contradictions that could impact the implementation of LORs. A range of barriers and enablers for the use of repositories within these communities will be identified on the basis of the analysis. What follows below is a discussion of some barriers and enablers identified by the curators of the LORs as part of the initial scoping exercise.

BARRIERS AND ENABLERS IN USE OF LORS TO SUPPORT LEARNING

An initial scoping of the repositories the communities took place October 2005. This involved the collection of data from the curators of the LORs on the key factors that influence the use of LORs by communities. All partners participated in the data collection except IVIMEDS. The following barriers specific to individual LORs as well as generic barriers to implementation of LORs were identified (Margaryan, 2005):

A number of issues were highlighted by the curators of the SIESWE Learning Exchange. Cultural issues included a mismatch across the nine higher education institutions served by the LOR and a reticence by teachers to students' use of the repository. Organisational issues arose from the management-driven requirement to collaborate which conflicted with inter-institutional competition for attracting students. This issue is broadly associated with the discipline-specific nature of this LOR (social work). Other issues more loosely aligned with the disciplinary context included users' poor technology skills and a lack of good technology support in some institutions. Finally poor understanding of IPR issues was cited as a problem.

Issues raised by the JORUM curators included cultural differences in attitudes to sharing and collaboration between the participating institutions; the critical mass and quality of the resources; technological issues related to usability and authentication; issues related to user skills and motivation such as a need for user training and support nationally and the costs associated with such support.

As a classroom-based LOR, some of the issues highlighted by curators of DIDET focused on pedagogical concerns. Issues included the need for classroom-based learning models to change in order to accommodate and encourage the sharing of student-generated resources. Furthermore, the requirement for Learning Objects (LO) to be decontextualised to promote maximum reusability was a major concern. In addition, the educational narrative within the metadata associated with these LOs did not provide the rich quality of information required for effective learning. Other concerns focused around cultural issues such as an existing mismatch in understanding between the developers and the users of the LOR. Information management issues included users' lack of skills in organising and categorising information which identified a need for information literacy training and longer-term support in the use of the LOR.

A number of generic factors that could impact the implementation of the LORs were also identified; many of which are in congruence with ideas being discussed in the literature. These included metadata management and quality; lack of resources for long-term management and maintenance of LORs; contradictions between organisational drivers and personal motivations of the users; cultural mismatches at

the organisational level and between the different stakeholders within the communities (for example LOR developers, librarians, users and the management).

A more complete data analysis will be presented at the conference.

SUMMARY

This paper summarises initial findings of a study investigating the social, organisational, and cultural enablers and barriers to implementation of LORs. The premise of the study is that the nature and organisation of a community is likely to impact the way a LOR is used. Key dimensions of communities were identified. Different types of communities were likely to encounter different barriers and enablers when using LORs, although some barriers would be generic. In addition, the different dimensions characterising the LORs, such as subject discipline, educational sector, geographic range, purpose of the community, and contributors, could be key factors in their utilisation. Four broad categories of issues in the implementation of LORs were identified; these include socio-cultural, educational, organisation and information management, and technological issues.

The interrelationships between the LORs and the communities were analysed using Activity Theory. Four specific LORs were analysed as activity systems. Data collected from the LOR curators allowed identification of issues and contradictions specific to individual LORs as well as a range of generic issues. These data will later be supplemented with user responses in an analysis of the communities. The activity systems of the LORs and communities will be further compared to elicit contradictions within and between them.

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