

Communities at cross-purposes: Contradictions in the views of stakeholders of learning object repository systems



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The increase in the number of online, educational communities necessitates a good interplay between digital communities and repository tools. However, there are contradictions in the views of those setting up repositories and the users of these systems. This may potentially lead to limitations in the usefulness of repository systems. This study aims to address this problem through identification of conflicting views of stakeholders within a number of educational communities. Three repositories are analysed as activity systems in order to identify how communities use these tools. These activity systems are used to identify contradictions between the views of users and curators. The paper ends with a framework that can help address the key issues arising from these contradictions and guide implementation of repository systems during the initial development stage.

Keywords: learning object repository, sharing, reuse, digital resources

Digital repositories and learning communities

Every day thousands of new digital communities are created across the world. Social networking sites such as MySpace (myspace.com) and Facebook (facebook.com) are attracting millions of contributors across the globe. MySpace has over 110 million registered accounts and, in 2006, grew at a rate of 250,000 new accounts each day (Marketing Vox, 2006). In the US almost 80% of teenagers and college students are members of at least one online community (Boyd, forthcoming a and b). One third of the population of South Korea, 22 million people, are participants in CyWorld (cyworld.com) (Trondsen, 2007).

The growth rate at which these communities exchange digital resources has been phenomenal. This escalation has led to a marked increase in the number and range of repository systems aimed at supporting sharing and reuse of different sorts of resources, for teaching and learning, often referred to as Learning Objects. Broadly speaking, a Learning Object (LO) is a granular, digital resource developed to meet a single learning objective (for definitions of an LO see IEEE, 2002; Koper, 2001; Wiley, 2001). LOs are designed to be integrated, aggregated (information resources are combined with learning activities) and sequenced to produce “units of learning”. Essential features of LOs are that they should be reusable, accessible, interoperable, and durable (Rehak & Mason, 2003). Therefore, it is crucial that LOs are stored in a way that makes them easy to share, source, and adapt for a variety of purposes. The repository systems that store such resources and make them available for reuse and sharing are termed Learning Object Repositories (Heery and Anderson, 2005).

There are problems with an overly simplistic view of Learning Objects that can be sequenced into discrete “units of learning”. Such sequences cannot capture the *essence* of a good piece of teaching (Friesen, 2004; Parrish, 2004; Wiley, 2003; Beetham, 2004). Learning Objects do not provide insight into the tacit changes in teaching tactics that teachers adopt during real-time learning situations. Nor do they offer insight into different ways in which teachers interact with students and provide feedback (Littlejohn, Falconer, & McGill, 2006). This tacit information is usually communicated through dialogue within teachers’ communities of practice. This view of LO sequencing has an impact on the design of repository systems. In order to be effective, these systems must extend beyond sourcing and sequencing information to allow for communication and dialogue around ideas about practice. Consequently dialogue within and across educational communities is an important aspect of sharing, frequently overlooked through the application of mechanistic sequencing approaches (Falconer, Beetham, Oliver, Lockyer, Littlejohn, 2007).

This paper is based on a study that aimed to analyse the ways in which different communities use repository systems. ‘Community Dimensions of Learning Object Repositories’ (CD-LOR) was funded by

the UK Joint Information Systems Committee (JISC). Our hypothesis is that the way repositories are used will vary according to the needs of individual communities; therefore the issues associated with the implementation and use of repositories will differ across communities, although some will also be common across communities. For example geographically dispersed teaching and learning communities are often loosely knit. In such communities, members will communicate and interact in different ways as compared with locally based, tightly knit communities (Littlejohn and Margaryan, 2006). To understand the relationship between communities and repositories, we consider ways three different communities use repository systems. We identify contradictions in perceptions of individual stakeholders' within these communities and propose a framework to support repository implementation.

Dimensions of repositories and communities

The way communities use repositories differs across the range of communities that have been established and the repository systems that support them. The relationship can best be understood through consideration of important aspects or dimensions of repositories and communities. Key dimensions were abstracted through focus group activities with curators representing a number of different repository systems (Margaryan, A., Currier, S., Littlejohn, A., & Nicol, D., 2006):

- a. The *purpose* of the repository;
- b. The *subject discipline* the LORs has been created to support. Although some LORs are mono-disciplinary, many are multidisciplinary;
- c. The *scope*, for example some LORs support single departments or institutions, while others operate at a regional, national, or international level;
- d. The *sector*, LORs are used in schools, higher and further education institutions as well as hobby-based or work-based communities;
- e. *Contributors* may include teachers, students, publishers, institutions, employees or hobby enthusiasts, depending on the scope and sector;
- f. The *business model* that governs the trading, and management framework underpinning the repository.

These six dimensions draw out important aspects of the context within which the LORs operate within and across communities.

LORs are increasingly used across a range of diverse communities, including work-oriented (communities of practice), research-oriented and learning-oriented communities (classroom communities, virtual university communities. There are a range of factors that may influence the ways in which communities use LORs:

- Motivational factors, such as members' roles, status, and relationships within the community. Community ground rules, how these develop and are supported, and how reconciliation of multiple agendas is supported;
- Control factors, for example whether the community is perceived as open or closed, who controls resource access and use, existing rewards and incentives for sharing and using LOs;
- Cohesion factors, such as the size, spatial location, modes of communication and effectiveness of a community, its rhythm and maintenance;

Dimensions of communities include:

- a. *Purpose*, the shared goal/interest of the community; the reason why the community was formed in the first place;
- b. *Dialogue*, modes of participation and communication (online, face-to-face, or mixed) adopted by the community;
- c. *Roles and responsibilities*;
- d. *Coherence*, whether the community is close-knit or loosely confederated/transient;
- e. *Context*, the broader ecology within which the community exists (for example, institutions, organisations, professional bodies, governments, etc.);
- f. *Rules*, implicit and explicit rules that govern the functioning of community (for example, ground rules of conduct, rewards and incentives mechanisms, control of access and use of resources, etc.); and
- g. *Pedagogy*, predominant teaching and learning approaches used in the community (for example, problem-based learning, collaborative learning).

Our starting point was that the way repositories are used depends not only on the dimensions of repositories, but also on key characteristics of communities. Therefore, it is important to integrate dimensions of repositories and communities, and provide an analytic lens to investigate issues surrounding the use of learning object repositories (LORs) to support learning within a diverse range of communities. One such analysis can be carried out through the activity-theoretical framework. The framework will help to integrate key actors and processes involved in use of repositories by communities, as well as identify and compare perception of the actors.

An activity theory framework for analysing LORs and communities

Activity theory (Engestrom, 1987) is one of a number of socio-cultural approaches to learning that emphasise the importance of social and cultural contexts in learning (Leontiev, 1978; Vygotsky, 1978; Bandura, 1977, Lave, 1997, Wenger, 1998). Learning is located in collective practice rather than in individual activities. Therefore learning can be viewed as an expanding engagement with a social practice, rather than as the passive acquisition of decontextualised knowledge. Therefore Activity Theory offers a conceptual framework 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 has three main premises:

1. *The social origin of learning.* LOR systems can support social interactions and co-creation of knowledge. However, since knowledge is distributed across individuals within communities, these systems must support individuals' interactions. This means that repositories should be more than a storebox of resources and should have associated services that allow individuals to communicate and collaborate
2. *The mediation of learning by tools.* Clearly changes in LOR systems will bring about changes in communities since the social co-creation of knowledge is facilitated through the use of tools. Some tools are more appropriate for certain types of activities than others, because of their affordances (Norman, 1988; 1990). Therefore different sets of tools can fundamentally change the nature of activities within communities (Jonassen & Rohrer-Murphy, 1999).
3. *The goal-oriented nature of learning activities.* Learning activities are outcome-oriented, driven by the learners' goals and motives and are influenced by a number of factors (prior experiences, interpretation of the expectations of others, and identification of the strategic purpose and value of personal actions) (Leontiev, 1981).

An activity-theoretical construct which can help analyse how communities use LORs is the "activity system" (Engestrom, 1987). Activity systems are sociocultural settings where community members (subjects) have a shared goal (outcome), set of actions to achieve the goal (object), and set of tools (instruments). These tools (instruments) are used to act on the object to achieve the outcome. This tool-mediated action maybe constrained or enabled by implicit and explicit rules (rules); the broader context (community) within which the activity takes place. Labour is divided amongst the community members (roles). When the community members carry out a learning task (object) to achieve a shared goal (outcome), using a repository (instrument), their interactions can be described as an activity system. For example, students in a product design course (subjects) may undertake a product design project (object) in order to learn the principles of product design (outcome). These students may use a repository (instrument) to share information and resources to support their design projects. These relationships are illustrated in Figure 1:

This means that Activity theory offers a holistic framework that allows us to study LORs and communities as a single system, rather than as a loose set of instruments, subjects, objects and outcomes. Rather than being a prescriptive theory, it provides an analytic lens to understand the complex relationships within each system. Activity theory can also be used to identify "contradictions" (Engestrom, 1987), or mismatches within and between the elements of the system. In the next section, three specific LORs are analysed as activity systems in order to identify how they are being used by communities to support learning. These activity systems are compared to identify contradictions which may affect the use of repositories. A range of barriers and enablers to effective use of repositories are identified through this analysis.

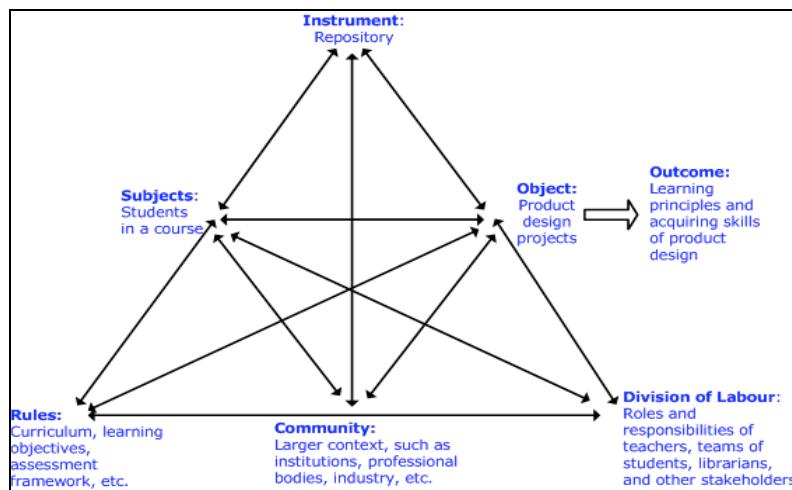


Figure 1: An activity system of a LOR community

Methodology and data collection and analysis procedure

To analyse how repositories can support learning within learning communities, it is crucial to understand the role of repositories and their relationship with other components of the community, from the perspective of the main 'actors'. In this case the main actors are the community members/repository users and the repository curators. This focus on the experience of individuals requires a phenomenographic approach (Marton and Booth, 1997). However, rather than being interested in studying the individuals' experiences of repositories in isolation, we want to know how these experiences are related to the key components of the broader context in which they take place (i.e. the activity system). This requires a phenomenographic analysis of activity system (Berglund, 2004). Coupled with activity theory, this analysis can elicit investigation of individuals' perceptions of a phenomenon – in other words it allows analysis of the interplay between a repository system and a community (activity system).

The analysis involves two steps. Firstly, selected curators' and users' experiences of repositories are elicited via in-depth interviews following the phenomenographic methodology. The interviews elicited individuals' perspectives on the key dimensions of the repositories and communities. They revealed details of the range of tools users employ to communicate with others in the community, the tools users draw upon to manage their personal information; the barriers and enablers individuals experience while using repositories; the perceived impact of the use of repositories on practice; and general aspects of using repositories (for example, users' awareness of individual repository systems, their decision to use a particular system and so on). Secondly, the findings are analysed using the construct of the activity system, and variations in and contradictions between the experiences of these two groups of actors are identified.

Analysis was carried out on three distinct repository systems. These systems were selected because they were all in a relatively advanced stage of implementation (each had a small group of relatively active users):

- Jorum – a UK national repository for sharing resources in a range of different formats across higher (university) and further (TEF or vocational) education;
- Spoken Word - an international repository for higher education containing audio files from BBC archives;
- DIDGET - a higher education, classroom-based repository for resources created by students.

Interviews with three curators and six users were conducted face-to-face or by phone. Each interview lasted an average 1 to 1.5 hours. Each was audio-recorded and transcribed. An overview of the respondents is shown in Table 1.

Results

This section provides an overview of the findings for each repository and community alongside an analysis of the contradictions in perceptions of the repository curators and users.

Table 1: Overview of the respondents (n=9)

Respondents	LOR	Role	Experience with LOR
R1	DIDET/LauLima	Student	Advanced: 3 years
R2	DIDET/LauLima	Researcher	Intermediate: less than a year
R3	Jorum	Educational Developer	Beginner: just started using it
R4	Spoken Word Services	Teacher (English)	Advanced: 3 years
R5	Spoken Word Services	Teacher (Economics)	Advanced: 3 years
R6	Spoken Word Services	Teacher (Social Work)	Advanced: 3 years
R7	DIDET	Curator	Expert
R8	Jorum	Curator	Expert
R9	Spoken Word Services	Curator	Expert

Jorum

Jorum (<http://www.jorum.ac.uk>) is a UK-based, national, interdisciplinary repository available to all teachers (but not learners) within UK higher and vocational education institutions. Jorum's aim is to make learning and teaching materials in all disciplines available to teachers in every UK University. Jorum has two interrelated services. The "Jorum Contributor" service collects, gathers and uploads resources created by individual teachers or nationally-funded initiatives. These resources are uploaded by nominated contributors from each institution or initiative. The "Jorum User" service provides teachers from all UK institutions access to all resources within Jorum. Users can source, preview, download, repurpose, and reuse materials. The key dimensions of Jorum are outlined in Table 2.

Table 2: Key dimensions of Jorum

Purpose of the repository and types of resources	To collect and make available learning and teaching materials to all UK higher and further education institutions. A wide variety of resources are available, ranging from single files, images, and documents to IMS content or SCORM packages
Disciplines	All disciplines
Scope	National
Sector	Higher and further education
Contributors	Designated contributors in each institution collect resources from tutors; JISC-funded projects contribute resources arising from these projects
Business model	Trading model and incentives critical within and across disciplines; requires separate organisation (for example, JISC) or consortium to manage LOR, workflow, and digital rights
Purpose of the community	To share resources across institutions and disciplines
Dialogue	None at present
Roles	Designated contributors collect and submit resources; curators provide training and technical support, as well as curatorial services
Coherence	Loosely knit
Context	National, multi-institutional
Rules	IPR and curricular differences across different sectors and disciplines
Pedagogical approaches	Focus on content; possibly distant from learning culture of individual institutions

Contradictions in perspectives of a curator and a user were analysed through interviews. These contradictions are illustrated in Figures 2 and 3.

One major contradiction within the Jorum system is the way in which the actors - the curator and the user - perceive the "object" of the activity systems (C1 and U1 in Figures 2 and 3). The curator has a long-term perspective, aiming to encourage sharing of resources across institutions and disciplines. Conversely, the user is focused on short-term tasks such as sourcing digital content for the institutional virtual learning environment (content management systems) and finding self-study resources for students. Subsequently, the main outcome that the curator wants to achieve is improved teaching and learning, whereas the user's goals focus on the administrative functions (C2 and U2 in Figures 2 and 3).

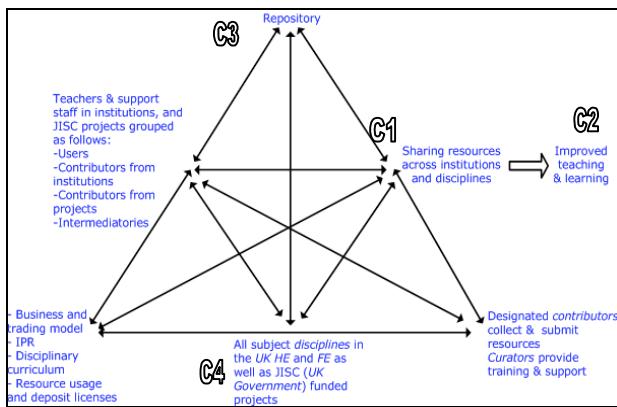


Figure 2: Jorum: Curator's perspective

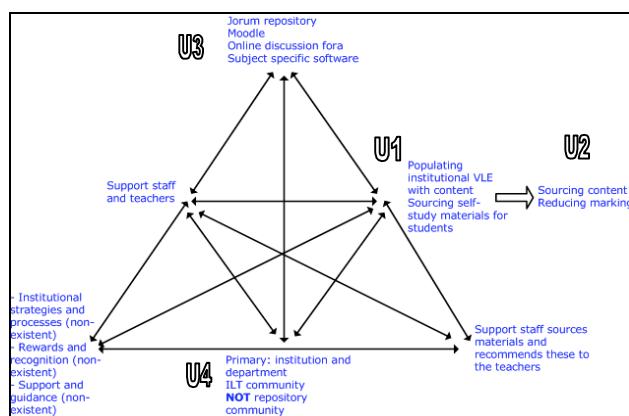


Figure 3: Jorum: User's perspective

Another misalignment is in curator's and user's view of the "instrument" of the activity system (C3 and U3 in Figures 2 and 3). The curator focuses on the repository, and doesn't appear to be aware of the range of other tools that may be used by the community members. The user employs a number of tools alongside the repository system.

Finally, there are contradictions over what constitutes a community (C4 and U4, Figures 2 and 3). The curator views the community in broad terms, whereas the user identifies primarily with institutional, departmental and professional communities, and explicitly stated that she does not feel part of the community of repository users.

Spoken Word Services

Spoken Word Services (<http://www.spokenword.ac.uk>) is an international repository based at Glasgow Caledonian University in the UK. The purpose of this repository is to share authentic audio resources across UK and US higher education institutions. These resources are BBC radio archives, such as interviews, features, documentaries, and news coverage of key events. These audio resources are supplemented by text-based materials including journal articles, reports, legislation documents, and relevant websites. The audio resources are prepared from BBC archives by repository curators and then assessed for relevance by subject-matter experts. Teachers can search the Spoken Word archives for resources they can use in class. The teachers download these resources and make them available to students, as streaming audio, mostly from their personal websites or from the institutional virtual learning environment. Students listen to the audio files to help them carry out learning tasks. Students have opportunity to share ideas, comments, queries, and reflections on the audio material via online discussions or other interactive features. Key dimensions of Spoken Word Services are summarised in Table 3. The findings, illustrated in Figures 4 and 5, highlight the main contradictions in the activity system.

The analysis shows major misalignments in the perceptions of the "object" and the "outcome", similar to the major misalignment within the Jorum investigation. In this case the curator's aim is to enhance and transform the educational experience, but the users focus on providing students with, authentic content resources that they hope students will find interesting and motivating (C5 and Ua/b5 in Figures 4, 5 and

6). In terms of the object, curators aim to enable sharing of resources across institutions, while the users simply want to source materials for use within their courses (C6 and Ua/b6, Figures 4, 5 and 6).

Table 3: Key dimensions of Spoken Word

Purpose of the repository and types of resources	Integration of digitised audio into courses
Disciplines	All disciplines
Scope	International
Sector	Higher education
Contributors	BBC archives; teachers and students within UK and US higher education institutions
Business model	Sources provided and made freely available by the BBC; this model requires staff commitment and incentives for use within the institutions
Purpose of the community	To share audio resources across institutions and disciplines
Dialogue	Local face-to-face dialogue amongst teachers; rudimentary community of practice currently coalescing
Roles	BBC provides sound clips. Curators expand these sound files with other resources (transcripts, URLs, etc); teachers source, annotate and make resources available to students
Coherence	Loosely knit
Context	International, multi-institutional
Rules	IPR; learning objectives
Pedagogical approaches	Content can be incorporated into a variety of pedagogic approaches; possibly distant from learning culture of institutions

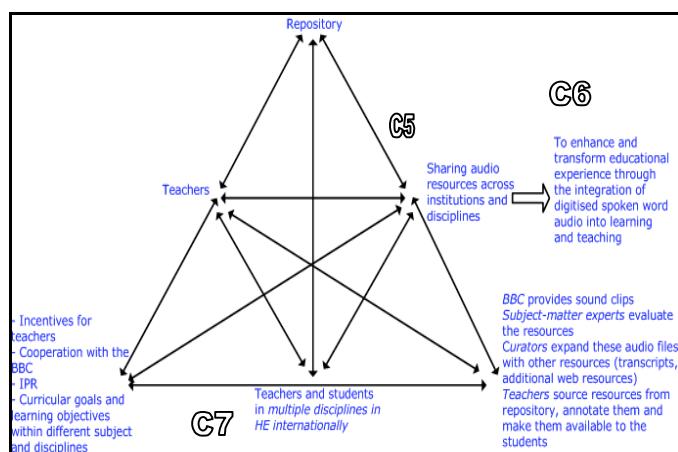


Figure 4: Spoken Word: Curator's perspective

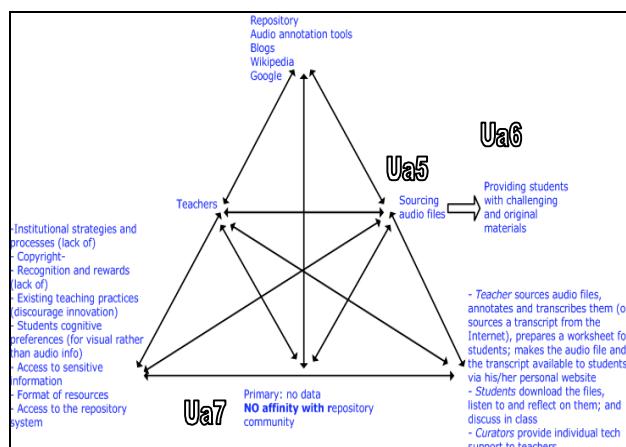


Figure 5: Spoken Word: User 1 perspective

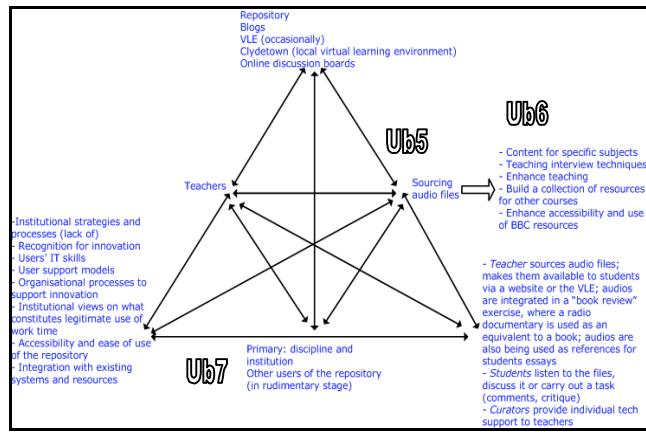


Figure 6: Spoken Word: Users 2 and 3

With regards to the community affiliation, two user respondents indicated that a rudimentary but coherent community was forming around the community. However this perception was not shared by the third user respondent who felt no affinity with the repository community (C7 and Ua/b7, Figures 4, 5 and 6). These findings reflect the relationship between the coherence of a community and its scope: the former two users are based in the same university in the UK, while the latter user works in a university outside the UK.

Digital libraries for global distributed innovative design (DIDET)

DIDET (<http://dmem1.ds.strath.ac.uk/didet/>) is a repository system supporting engineering design education at the Universities of Strathclyde (UK) and Stanford (USA), funded by JISC (UK) and the National Science Foundation (USA). DIDET is used to support classroom-based communities within these two institutions. DIDET supports a number of learning activities in a product design course at Strathclyde. In this course, students are given an assignment for designing and developing a domestic product. External companies set the design briefs and assign coaches to guide students in carrying out the designs. Product design involves three phases: (a) information gathering, storing, and structuring, (b)

Table 4: Key dimensions of the DIDET repository and community

Purpose of the repository and types of resources	Support engineering students' group design projects; contains student- and teacher-created resources, links to external resources, including external discipline-specific repositories
Disciplines	Design and manufacturing engineering
Scope	Classroom-based
Sector	Higher education
Contributors	Students, tutors, industry-based coaches and information specialists
Business model	Trading model is not applicable, but commitment from academic staff is necessary; incentives might be required at departmental level to motivate all staff to participate
Purpose of the community	Learning about product design principles through applied projects
Dialogue	Communication face-to-face, as well as via blogs, wikis, chat, and discussion tools available within the electronic environment
Roles	Coaches define project brief and give students feedback; students in groups progress their product designs by sourcing, evaluating, sharing, and integrating resources; tutors guide students and assess the project outcomes; information specialists provide guidance and skills training in resource management, and maintain the digital learning environment
Coherence	Tightly knit community; classroom facilitation important; small group learning
Context	Institutional and subject-specific (engineering), with links to industry
Rules	Curricular aims and learning objectives of the course; learning assessment
Pedagogical approaches	Wide range of resources; learning task design critical; different pedagogies possible although focus on social constructivist pedagogies (collaborative and project-based learning)

concept generation, and (c) development and prototyping (McGill, Nicol, Littlejohn, Grierson, Juster, & Ion, 2005). Over six weeks, the students work in small teams of four, meeting face-to-face several times per week. Tasks and assessments are designed to encourage students to store and share information online. Resource sharing is supported through the repository system where students can store, share, and manage materials. During an initial storing and structuring phase, students collect, evaluate, and store materials from a variety of sources to supplement resources created by other students. In the concept generation phase, students are required to collaboratively construct concept maps to justify their design concept. The design phase involves the students populating these maps with information resources. During these two phases, an information specialist guides students in selecting, evaluating, organising, and storing information. By organising and structuring information in this way, the students justify and capture their design decisions. Key dimensions of DIDGET are summarised in Table 4:

The analysis of DIDGET as an activity system, both from curator's and users' perspective, is summarised in Figures 7-9.

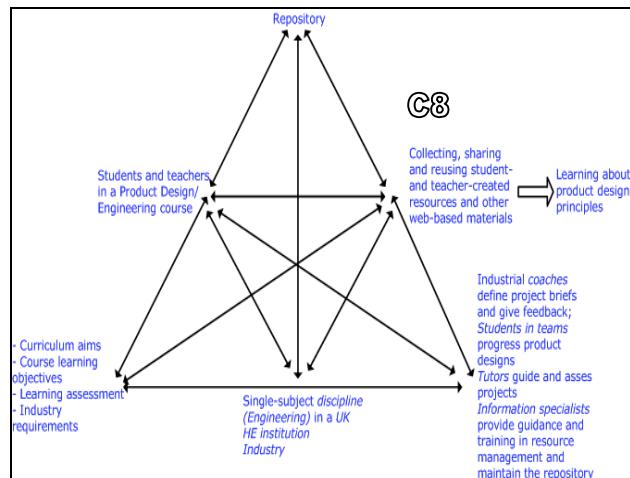


Figure 7: DIDGET: Curator's perspective

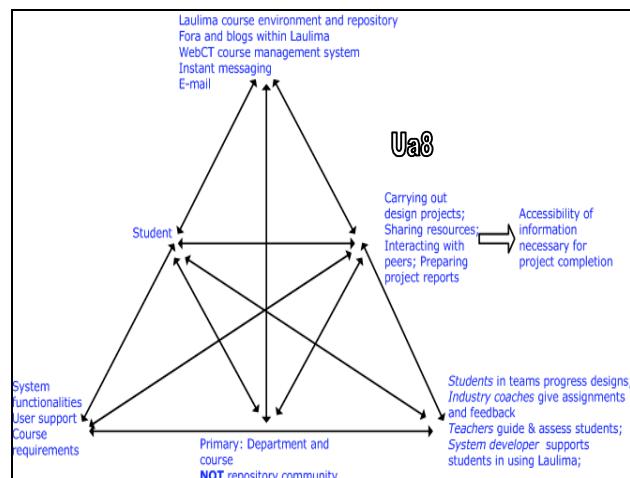


Figure 8: DIDGET: User 1 perspective

In contrast to the previous examples, no major contradictions were identified. However, there was cross-over of perspectives in relation to the object and the outcome of the activity system (C8 and Ua/b/c8, Figures 7-9). According to the curator, the goal was for students to learn about product design principles through collecting, sharing and reusing resources. According to the users the main goal was to be supported in managing the information resources necessary to carry out design/ research projects. Essentially these perspectives are the same; however the users and curator have a different emphasis in their outlook.

This lack of major mismatches is in contrast to Jorum and Spoken Word. One explanation is that DIDGET has a narrower scope than the other two systems: it is classroom-based, which means that the user

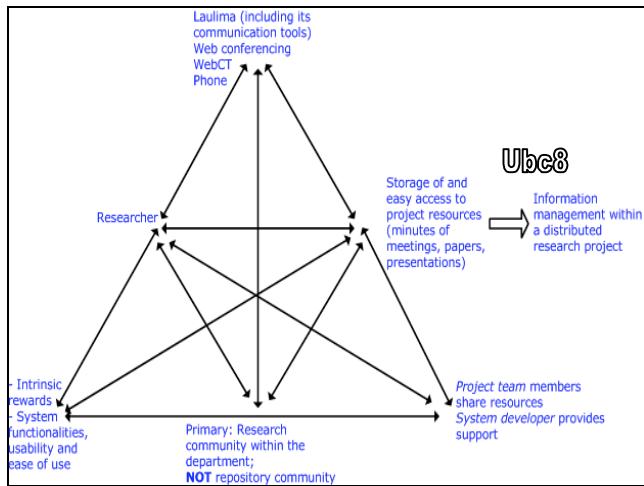


Figure 9: DIDET: User 2 perspective

community is tighter-knit. Interestingly, both users indicated that they did not perceive themselves as members of a 'repository community', but they did feel part of a departmental research or student community. Another explanation for this alignment of perspectives is due to system integration (that is, integration of the repository with the learning environment). In contrast to the previous examples, DIDET users could not distinguish between the repository system and the electronic learning environment they used.

In summary, analysis of these three repository systems revealed two major mismatches in the perceptions of repository curators and users:

Firstly, curators focus on repository-centric factors, while users spotlight a wide range of contextual factors.

Repositories are frequently introduced to users as standalone tools. However, from the users' perspective a repository is simply one component within an entire activity system. It is not enough to consider the ways different system components might fit together. From our analysis it is clear that curators and users have to think through the ways in which individual components inter-relate.

Secondly, curators are concerned with the long-term goals of the repository, while users tend to consider short term outcomes.

Users are likely to adopt short-term goals, while curators may focus on longer-term outcomes. Lack of alignment between the vision and the day to day implementation has been cited as an issue affecting transformational change in many organisations (Collis and Moonen, 2001; Hammond and Karran, 1998).

Our analysis illustrates that curators are not always aware of users' expectations of the repository, their view of the communities they belong to, the implicit and explicit rules that govern these communities, and the tools they use in conjunction with the repository. Effective implementation of LOR systems requires careful alignment of these diverse perspectives.

Although activity-theoretical analysis is useful to identify misalignment in perspectives, it is not practical for repository curators, managers, or those involved in repository implementation. We need a simple technique to make sure diverse perspectives are aligned and contradictions, issues and barriers are avoided. One way we can achieve this goal is by use of a framework that integrates repository and community dimensions.

Next steps: Evaluation of a framework for development of LORs

By combining the community and LOR dimensions, we developed a framework that can be used to systematically examine contradictions and issues that span across dimensions and components of activity systems. The framework operationalises the components of the activity system of a community using a repository by combining the community and repository dimensions discussed earlier in this paper. The components are expressed as a series of questions to guide curators in thinking through how to align their goals with those of the users:

1. Why are you setting up a learning object repository?
2. How many communities do you serve?
3. What is the purpose of the community that the repository will serve?
4. Who are the key actors in the community and who, of these, will contribute to the repository?
5. What is the pedagogic approach of the community?
6. How coherent is the community?
7. What are the modes of participation and communication within the community?
8. What are the key factors in the ecology of the community?
9. What is the business model of the repository?
10. How will your LOR evolve?

This framework has been developed into a set of structured guidelines offering specific advice, resources and examples from practice, as well as recommendations http://www.academy.gcal.ac.uk/cd-lor/documents/CD-LOR_Structured_Guidelines_v1p0_001.pdf These guidelines are being evaluated by a number of organisations establishing repository systems for user communities, including the Carrick Exchange (Lefoe, 2007). This will allow us to evaluate if the framework can be used as a tool to close potential gaps in perception between users and curators of repositories. It is clear that successful development of communities of practice will not be driven by LOR systems, but by the communities themselves. However effective implementation of these tools can lead to more successful communities.

Acknowledgements

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