OPEN
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RESOURCES

CONVERSATIONS
IN CYBERSPACE

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Open Educational Resources
Conversations in cyberspace

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Section 2.
Ongoing discussion

During the final week of the forum of 2005, participants were invited to identify the most important issues to be addressed in order to enable and promote OER. The intention of this polling exercise was twofold:

- *to begin to build a comprehensive list of issues and concerns related to the advancing of the OER movement,*
- *to identify topics of highest interest for a more informal discussion in the community in early 2006.*

The need for research was one clear area of interest, and thus the subject was proposed to the community for a more leisurely interaction than that which the tightly organized forum had permitted. However, the energy and enthusiasm of the community remained high in this and subsequent sessions, and it could hardly be described as 'leisurely'. During the first session on research, another topic was put forward – the importance of developing a 'Do-It-Yourself' resource. In turn, this second discussion identified the topic of the third – Free and Open Source Software for OER.

Although the ongoing discussion was indeed less highly structured than that of the first forum, the reports on the three topics are indicative of the high level of debate that was maintained.

Chapter 5
A RESEARCH AGENDA FOR OER: DISCUSSION HIGHLIGHTS
Kim Tucker and Peter Bateman

It was clear from the discussion in the 2005 forum that Open Educational Resources are recognized as having an important role to play in increasing access to knowledge worldwide. However, it was also clear that more study and information is needed to understand how to best produce, share, adapt and use such resources. In the first session of 2006, the community deliberated on a research agenda for OER. As a large international group with broad geographic representation, the community was ideally placed to work together on this rather daunting task. Furthermore, the range of positions of participants ensured a rich diversity of perspectives.

Over 100 research questions were put forward during the wide-ranging discussion, and a priority list of 25 was suggested. However, arriving at a consensus on a definitive research agenda would require more reflection and interaction. A wiki was created to provide a common work space for ongoing development by interested members of the community.

1.   BACKGROUND

The diverse nature, scale and scope of many current OER initiatives presents a considerable challenge to those who stand to gain the most from the movement: learners, educators and researchers in the developing world. All would benefit from an exploration of the issues that most concern them. Research would inform their involvement in the OER movement and make their first steps more comfortable and assured.

It is important for those participating in the OER movement to be clear that the delivery of resources should not be mistaken for provision of quality education. Research activities that locate the OER movement within the broader challenge of creating effective education systems will ideally lead educators to consider their own pedagogical practice and how it might be improved. In doing so, they will also need to consider the complex nature and diverse contexts of these systems, with varying knowledge needs, abilities, and access to appropriate technologies and resources. This is the reason for seeking to develop a research agenda for OER: to support resource development and use in the most effective manner possible.

This report provides an overview of the discussions aimed at developing such an agenda. More than 100 questions were proposed and, from these, members were asked to identify their priority research questions. This proved more difficult than expected, either because many of the questions had significant and interdependent value for the many, very different members of the OER community, or perhaps because there were too many questions from which to choose! After further discussions, an attempt was made at categorization of the questions. These categories may serve as a basis for the OER research agenda.

2.   RESEARCH QUESTIONS, CATEGORIES AND PRIORITIES

Questions and categories

The discussion opened with the facilitators asking participants to suggest priority research questions. In response, participants proposed a total of 107 questions,[30] which were categorized initially by the facilitators as follows:
- background research,
- economics,
- methodology (research),
- creation,
- quality assurance,
- dissemination,
- finding,
- using,
- localization,
- interventions,
- scenarios,
- policy.

The categorization elicited some comment from the group and prompted one participant to suggest a possible alternative with only five categories:
- *OER creation*: independent or collaborative development, quality assurance, iterative processes and localization (including translation), interoperability and standards compliance, and capacity development for OER creation;

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30   The full list of questions is presented in the first appendix to the original report, which can be downloaded from http://oerwiki.iiep-unesco.org/index.php?title=OER_research_agenda. The list is also available in wiki version (http://oerwiki.iiep-unesco.org/index.php?title=OER_research_questions_longlist), so that it may be further refined and enhanced by the community (Editor).

- *Organization*: governance and management schemes, intellectual property rights and licensing issues, tagging and metadata systems, classification methodology and searchability;
- *Dissemination*: awareness raising and delivery methods, particularly for low-bandwidth situations;
- *Utilization*: mechanisms and business models for use and reuse;
- *Interventions*: localization, actors, messages and lessons learned, best practice, learning patterns and scenarios.

A keen observer noted that policy seemed to be missing from this second system, and questioned whether any 'interpretation' (through categorization) of the list, though reasonable to the interpreter, might take something away from the original. This point notwithstanding, the original questions and categories served as the basis of most of the discussions that followed.

Prioritizing research questions

Following the initial development of the listing, participants were asked to identify their top priority research question. This resulted in a shortlist of 25 questions.[31]

Very few questions received more than one vote, making it clear that there was no consensus on the priorities. This is indicative of the diverse nature of the community – the wide range of backgrounds, perspectives and interests represented and expressed may make it difficult to achieve consensus, but this is precisely what makes this community so interesting and important.

Some participants expressed reservations about selecting just one priority from so many, arguing that the questions are interdependent and all have some significance for the OER movement. Alternative suggestions included taking a more formal approach to identifying research questions, adopting a decision-making process similar to that used by the IMS learning technology standards group,[32] and splitting into working groups to address each research category. Others argued that the community should be moving towards action, for example community building to address access issues, rather than focusing on research.

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31   Presented in Appendix 2 in the original report, the shortlist can be downloaded or accessed in wiki version at http://oerwiki.iiep-unesco.org/index.php?title=OER_research_agenda (Editor).

32   See http://www.imsglobal.org/background.html, for more information on IMS.

3.   DISCUSSIONS BY CATEGORY

Background research

Discussions on this topic focused on what we already know about OER. The aim is to understand current OER practice: user needs, usage levels among various user groups, characteristics of organizations successfully using OER, the importance of standards, describing and classifying resources and initiatives, contextual factors (e.g. low bandwidth), effectiveness of OER, and learning from other open initiatives.

Economics

Some discussion dwelt on how OER development could be financed in a sustainable manner. Participants recognized a need to define economic and business models and made the following points:

- Although OER offers significant opportunities for innovation in education, there is a need for *long-term funding* to realize that potential.
- The imbalance between developing and developed countries in the use of technology for education means that there is a need for economic models that promote *equality in access, production and use* of open content, irrespective of geography or social and ethnic background.
- OER provides an opportunity for open dialogue; previously unheard voices can ask questions, contribute ideas and break the restrictive mould of traditional academic structures. *Social equity and open access* are therefore vital, but academic powers could seek to marginalize them in the name of economic protectionism.
- *Content development costs* are enormous for conventional textbook publication. Open textbook content would be a less costly option.

Methodology

Participants chose to examine some of the characteristics of effective research, rather than looking directly at research methodology. It was generally agreed that research should be oriented towards discovering what works, what does not work, how to improve learning processes, and what new features learning resources need. Localization questions, collaboration, learner support, stakeholders and roles, best practice, and learning patterns and scenarios should all be considered.

The wide range of research areas and questions suggests recourse to an equally wide variety of research methods, which would need to be considered carefully on a project-by-project basis. Surveys and traditional research methods could play a major role in background research in most of the areas listed. Anthropological research techniques, for example, could be especially well suited to studying OER communities and online collaborative initiatives, or cultural issues connected to adapting and using materials in new contexts. Research on interventions and scenarios, however, may require variations on action research, or design, development and constructive research.

Creation

Insights on creating OER abounded throughout the discussions. A key part of this theme was an exploration of 'collaborative authoring' – the need to develop a culture that will promote collaboration and that is supported by appropriate licensing, formats and standards. Another debate contrasted the relative merits of authoring by professional peers and authoring by learners.

The idea of a 'Do-It-Yourself' (DIY) OER portal was put forward in response to a question on how to involve a wider range of OER stakeholders in the creation process. Much of the discussion on the creation of OER (as well as several other topics) had this DIY OER portal in mind. The idea of a portal is explored further below.

Quality assurance

Quality touches everything and is central to most research areas – OER creation, commons-based peer production (Benkler, 2002, 2006), technology investigations, dissemination, learning patterns, etc. It was noted that quality OER is the result of quality OER development processes, and that quality OER practice is a fertile area for research. The discussion touched on tools and methods for supporting quality OER development. Participants expressed a need for guidelines that set out quality and interoperability criteria. The following quality issues were also discussed:

- *Ensuring high-quality translation of resources*: Massachusetts Institute of Technology (MIT) indicated that they have set up a rigorous evaluation process for prospective translation partners. Quality and localization was a natural extension of this discussion.
- *Facilitating the discovery of good-quality OER*: Participants observed that quality is subjective, and that quality standards for one situation might not be applicable to another. Relevance is therefore a key component

of any measure of quality. There is a need for consistency in the way that OER descriptions and metadata are formulated, so that a user can understand the original context of creation and use of a resource, and can find and select the most suitable resources for use in their own situations.

- *Learning from open source software development and other open content initiatives*: Participants questioned how easily the ideas that 'many eyeballs tame complexity' (Raymond, 2001), and that interaction among users and developers will eventually result in error-free code or encyclopedia entries (Giles, 2005; Wikipedia, 2006) could be applied to OER.
- *Assessing the expertise of OER contributors*: In the case of collaborative development initiatives, it was suggested that all contributors should have a verified level of subject matter or instructional design expertise. A review team could define assessment criteria and place a submission approval form online. If the application were self-selecting in this way, only those with the appropriate knowledge and skill could be approved to submit content. This process is rigorous but would be the best, over time, to assure quality content.

Dissemination

The main issues raised regarding OER dissemination were:
- awareness raising about OER;
- delivery methods, especially for low-bandwidth communities.

Finding OER

How do educators and learners access, identify and select OER that meet their needs? And what barriers exist to doing so? These issues were also raised in the context of quality assurance (see above). A key part of an OER portal could be provision of a resource for those looking for 'quality-assured' materials that are suitable for adaptation to their own teaching and learning environments.

Localization

Translation and localization issues (i.e. adaptation of OER to new teaching and learning contexts) were discussed. Participants stressed that it is important to localize not only content but also the learning process. The work should be a collaborative effort between educators, content experts, learning scientists

and instructional designers so that the resulting materials are enriched by expertise in the subject area and in learning design.

Interventions

In the developing world there are many projects and initiatives to promote access to information and communication technologies (ICTs). Examples include installing computer laboratories in schools and access points in community centres. Participants identified a need for research on how best to augment ICT interventions with relevant and appropriate OER. The research on interventions would also be geared towards how OER initiatives are structured and the key decisions required for implementation. Suggestions included:

- building a research programme around interventions to introduce ICTs, including Free and Open Source Software (FOSS) and OER; the aim would be to develop a framework for research that is flexible enough to be tailored to local situations and projects;
- identifying ICT training needs (e.g. learning to use a mouse, keyboard, office software, email, web browser and course management system, how to edit text and graphics, how to create and share multimedia resources), plus effective approaches and success factors for such interventions;
- focusing on activities related to the use of OER (e.g. using OER for self study or to enrich existing learning resources, using OER to learn how to improve living conditions in a community or get a qualification for a job), which may suggest new learning design patterns;
- engaging with communities (including learner communities), and assessing their needs and goals;
- establishing multiple interventions at various levels – in formal education systems and in informal learning contexts (i.e. at any place with access to ICTs and extending to reach those places without).

Scenarios research

The discussion on future scenarios focused on developments that best promote and use the dynamic, interconnected and self-organizing aspects of OER practice, notably social software and other technologies facilitating social interaction for knowledge exchange. The participants interested in scenarios research had a preference for activities in which learners are active in the design of curricula and syllabi, and in the creation of knowledge.

If users are to develop OER themselves, an interactive approach is ideal. Technologies are available to facilitate this, such as Web 2.0[33] technologies and peer-to-peer environments, where users can access multimedia resources (text, video, audio, etc.).

Policy

Although several policy issues emerged, the challenges with regard to copyright and licensing received the most attention. Participants discussed the choice of licenses available from Creative Commons. It was suggested that OER projects should use the most open, 'Attribution' license,[34] which places the fewest restrictions on the user (notably, allowing commercial use). It was argued that this license ensures that resources have the broadest possible impact, unlike those Creative Commons licenses that carry a 'non-commercial' restriction and are used by many OER projects.[35] For example, under the terms of the Attribution license, institutions can create books and CD-ROMs from online resources and distribute them to learners, even (if need be) charging a fee to cover costs. This is a key consideration for institutions operating in many parts of the developing world with limited internet connectivity. In addition, resources can be used by institutions without having to pay or obtain permission from the content creator, and can be 'remixed' easily with resources under other open licenses.

In defence of the non-commercial restriction, some participants argued that the potential license compatibility problem is not insurmountable. Users just need to obtain permission to combine restrictively licensed and more open resources. The question is, is this an unacceptable level of friction and a significant disincentive to the use and reuse of resources? Members were also reminded that the use of more restrictive licenses is far greater than that of the very open licenses; the non-commercial restriction in particular can be the key to broad faculty participation in new OER initiatives. Therefore, is it better to have more resources published with at least some degree of freedom for users, or a much smaller body of truly open resources?

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33   'Web 2.0' refers to the idea that the internet is evolving from a collection of static pages into a vehicle for software services, especially those that foster self-publishing, participation and collaboration, such as wikis, blogs and social networking sites. For more information see http://en.wikipedia.org/wiki/Web_2.0.

34   http://creativecommons.org/licenses/by/3.0/

35   The 'Attribution-NonCommercial-ShareAlike' license (http://creativecommons.org/licenses/by-nc-sa/3.0/) is a particularly popular choice.

Finally, it was argued that although the Creative Commons Attribution license is undoubtedly the least restrictive, it cannot be considered the most 'free'. Under the terms of the license, there is nothing to prevent a third party from creating derived works (e.g. translations, adaptations) and releasing them under a closed license – in effect locking up the content and not respecting the spirit of freedom intended by the original author.[36] With OER, the aim is to maximize impact through remixing and reuse, resulting in the creation of adapted or entirely new resources. For this reason, the 'Attribution-ShareAlike' license[37] may be the most appropriate choice, since it promotes a culture of continued sharing by guaranteeing the freedom of future derived works.

4.   ADDITIONAL DISCUSSION TOPICS

The DIY OER portal

The need for developing countries to become active participants in the OER world, adapting and using existing resources, and generating OER of their own, sparked a lively discussion regarding the possible creation of a 'Do-It-Yourself' OER development portal. A DIY site could popularize and promote the effective use of OER, introduce freely available technologies and software, and share good practice, as well as practical information on how to set up new OER initiatives and how to attract funding.

Considerable attention was given to the context of Africa, which is lagging behind the rest of the world both economically and technologically. Such a portal could also have a positive effect on the OER movement: the portal's significant wider use in the developing world could promote acceptance of OER by even the most traditional institutions and could help break down barriers to knowledge sharing, promoting a truly democratic sense of access and ownership. Through this, participants argued, the OER movement could lead to significant changes in the global imbalances in economics, education and the applications of technology and science.

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36   The Libre Manifesto (http://communities.libre.org/about/manifesto) suggests the 'the spirit intended', as does the free knowledge definition (http://communities.libre.org).

37   http://creativecommons.org/licenses/by-sa/3.0/

FOSS in support of OER

There was also discussion of the general trend towards openness through the Free and Open Source Software, Open Access and Open Educational Resources movements. It was suggested that these various open initiatives be explored for possible synergies. However, it was felt by some that drawing direct comparisons with other open initiatives risks imposing false parameters on the OER movement. Despite the shared emphasis on collaboration in both OER and FOSS development, it should not be assumed that what has worked for FOSS should automatically work for OER. Establishing a solid, research-based body of knowledge about OER may provide a better point of departure, before looking for synergies between the various open initiatives.

The argument for learning from other open initiatives attracted a lot of support, however, and the following areas of synergy were suggested:
- developing a knowledge-sharing culture – comparisons with FOSS communities;
- governance and management schemes for OER, including copyright and licensing;
- storage systems and portals;
- classification, tagging and metadata systems to improve interoperability and searchability;
- implications of a collaborative development approach for capacity development, productivity and workflow planning.

It was suggested that in fully open situations, where learners may be both OER users and contributors, the benefits and commonalities are greatest, and issues of scalability and sustainability are more easily handled.

5.   CONCLUSION

Throughout, the discussions were vibrant, well informed and extremely valuable. However, it was difficult to conclude that the main objective of the discussion was actually reached, in that the community did not agree on a specific research agenda. It seems that further discussion would be necessary to produce a research agenda with specific priority areas and questions.

On the other hand, the community's 'strength in diversity' was evident throughout the discussion – diversity in terms of the members, their perspectives, interests, activities, offerings and contributions. The dynamic[38]

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38   On account of being on the OER community wiki – the list of priority questions is 'alive', that is, evolving with input from contributors.

list of questions is a reasonable reflection of the research needs of the OER movement, and it was compiled by people with a need for answers, or a desire to address these issues. Rather than a final product, the agenda is therefore an ongoing process of communication and networking, to facilitate self-organizing, community-guided research and action, drawing on collective knowledge, guided by collective wisdom, and powered by the energy and enthusiasm of the community.

Whether the research agenda is viewed as 'product' or 'practice', the actions suggested during the discussion are relevant. A structure is proposed, consisting of 'formal' and 'informal' activities. Formal activities would require an individual or group to set aside resources to make them happen. Informal activities are ongoing support functions that would take place within the community.

Formal activities include:

- articulating a formal research agenda via a formal process;
- conducting reviews of OER, FOSS and open access research, with a synthesis indicating similarities, differences and mutual learning opportunities;
- conducting a workshop for OER and FOSS experts to brainstorm current and future learning opportunities, and publishing the proceedings;
- convening a joint discussion between the IIEP FOSS and OER communities.[39] This may include a discussion of the proposed OER, FOSS and open access research reviews and inspire the DIY OER portal design and development process;
- further exploring the DIY OER portal idea;[40]
- identifying champions to sustain the OER research community (perhaps) via the portal, wiki and discussion lists.

The informal activities boil down to community support and active participation in the formal activities. Informal activities are characterized as 'just-do-it' and 'libre learning' (Tucker, 2007) activities, whereby the community learns, functions, and adapts via unstructured, dynamic processes, using all resources available, and sharing knowledge freely to enhance global OER practice. For example, the OER community could be involved in the proposed research

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39   A joint discussion was organized and took place in October 2006. For more information, see Chapter 7 (Editor).

40   In fact, the DIY portal was chosen as the focus of the very next discussion in the community. See Chapter 6 (Editor).

reviews via online discussions, participate in the joint FOSS/OER discussion forum, contribute to the development of portal and wiki content, and generally continue to share and engage in community discussions with characteristic enthusiasm.

Without doubt, these initial discussions have made a useful contribution to the nascent OER movement. Ideally, the future activities of the OER community will expand on these ideas with the overall goal of improving global OER practice.

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Chapter 6
A 'DO-IT-YOURSELF' RESOURCE FOR OER: DISCUSSION HIGHLIGHTS

Boris Vukovic

During the first forum of 2005, one of the issues debated was that of language and culture. Adapting content, including translating it into the local language, could counter concerns about linguistic and cultural hegemony associated with the prevalence of English-language Open Educational Resources. However, it was noted that a global balance must be sought, wherein countries both produce and use OER. The main challenge in achieving this goal was seen to be the need for strengthening capacity, particularly in developing countries, in order to support such balanced development of OER worldwide.

As the community deliberated on a research agenda for OER, this idea resurfaced in the guise of a 'Do-It-Yourself' (DIY) OER development website. The OER movement is based upon both creating materials and sharing them, and adopting or adapting those shared by others. It was felt that those interested in creating their own materials would benefit from a resource that would help them do it themselves. The session was organized around four topics: the profile of the intended user, desirable content and services, the structure and organization of the resource and, finally, the underlying technology.

1.   THE CASE FOR A DIY RESOURCE

The central argument for a 'Do-It-Yourself' resource is the need to ensure access and opportunities for developing nations to benefit from, contribute to, and take ownership of Open Educational Resources. The community specifically cautioned against a model in which marginalized people and communities are seen largely as consumers of imported educational resources. The message expressed by some stakeholders from existing projects in African countries, for example, is clear: global efforts to advance OER must create opportunities for local content production and distribution. To this end, a DIY resource would need to include development guides, technological solutions and community support to assist individuals and projects in regions currently under-represented in the global OER movement. The pioneering OER projects generally originated in large, prestigious institutions; what is needed now are more sustainable solutions, models and resources for, and from, small-scale, local initiatives.

The resource base could also serve to build capacity for use and reuse of educational content. One definite conclusion reached in the community discussions is that there can be no 'one size fits all' approach to OER. One of the functions of a DIY resource would therefore be to showcase the diversity of OER initiatives and formally identify project 'attributes', such as type of content, choice of technology and licensing, funding model, and so forth. A directory of existing projects, with descriptors, would allow prospective creators and users to make informed choices, but also facilitate innovative derivative works and minimize unnecessary replication, especially with respect to technological solutions.

The initial conversation on a DIY resource moved forward with the community voicing their hope that UNESCO and the International Institute for Educational Planning (IIEP) would take on a leadership role in exploring the issue further. This is a proposition well aligned with the UNESCO mandate to act as a clearinghouse and to facilitate international discussion. The challenge was taken up by IIEP. Over eight weeks, in May and June 2006, the community was invited to generate ideas about a DIY resource, considering guiding questions in four key areas:

- potential users,
- content and services,
- structure and organization,
- underlying technology.

The summary of the discussions below constitutes a draft blueprint for further development of this DIY resource project.

2.   POTENTIAL USERS

A DIY resource needs to serve a variety of learners and those who enable learning, from traditional to self-directed students, from teachers seeking professional development to university professors interested in cross-cultural approaches to instruction.

Emphasis should be placed on pedagogically sound design, use and adaptation of educational resources. One of the main criticisms voiced by educators is that too often educational materials distributed online lack pedagogical value (e.g. an assignment without an evaluation scheme). This makes such materials unusable in their original format and difficult to adapt to new contexts of use. A DIY resource could provide guidelines and community support to help users make materials accessible for their specific teaching and learning needs. The production of innovative and creative works, derived from

original material, will increase the overall quality of the current OER corpus. And the process of adaptation of OER can, in and of itself, present a great opportunity for learning to take place.

Development efforts must take into account users in poorly resourced and remote areas with low (or no) bandwidth. To this end, a DIY resource should promote materials that are also designed for offline use, whether on CD-ROM, USB (Universal Serial Bus) flash drive, or other portable media, including print-friendly formats. This aspect is one of many that emphasize the role of a DIY OER resource in mapping a more equitable global progression of the OER movement.

The potential of a DIY resource for community-building was captured nicely by a suggestion that it could be better characterized as a 'Do-It-Together' resource. This emphasizes opportunities for collaborative work among experts from diverse professions and localities. It also communicates the capacity of the resource to support novices and newcomers to OER. The 'Do-It-Together' (DIT) dimension of the project could be envisaged as a bazaar of resources in which all those with an interest in OER converge around subject area 'stalls' with offers of materials, tools, and ideas for sharing, innovation and support.

Finally, in respect to the question of potential users, the community cautioned against focusing too heavily on whom specifically the DIY/DIT OER resource should target, and argued for the necessity of being inclusive. The challenge is not to profile a likely audience, as much as it is to develop design parameters that will be flexible enough to accommodate as many learners and educators as possible (where 'flexible' refers to technology, licensing, support, etc.). Outlining distinctive groups of users to be targeted by the resource runs a risk of bias and exclusion, as a function of community members' own backgrounds and affiliations. This is particularly important to consider since the present landscape of OER is dominated by projects from the world's most developed nations. Striving to maintain a culturally balanced perspective while planning for a DIY/DIT resource, it is impossible to envision all those who may benefit from OER initiatives in the long term, especially given the rapid transformations in internet communication and online educational resources.

3.   CONTENT AND SERVICES

In considering the content that the DIY/DIT resource should have, the community came up with a very pragmatic question: How can users in poorly resourced areas even begin to imagine what OER could bring to

their work if they do not know what is already out there? So, first and foremost, a DIY/DIT resource should present information about existing OER projects and approaches, and the tools and services that support OER creation, organization, dissemination and use. It is the consensus of the community that the resource itself should not host OER available elsewhere or serve as a repository for future resources. Rather, detailed information and links could be collected and catalogued into an OER directory, which should be editable by community members in a wiki. A DIY/DIT resource could also showcase established methods and services, ranging from listings of technologies to contact information for relevant interest groups.

In the planning and development stages, it is important to avoid replication, and to build on what is already available. Hence, over and above the existing variety of resources, the project could contribute community support and expertise to guide current and potential OER users in their decision-making and development efforts – an OER matchmaking service, as one participant characterized it. A DIY/DIT resource would bring together an informal consortium of OER practitioners to facilitate collaboration and broker partnerships. Although there are now many OER initiatives around the world, what seems to be missing is a mechanism to network them together to promote sharing of resources, experiences and expertise.[41] It is hoped that the project could serve that purpose by facilitating collaboration and partnerships through the strength of its community.

The community established an ambitious objective for a DIY/DIT resource: to educate. The intent is to take advantage of collective knowledge and experience to promote best practices in the way that Open Educational Resources are developed, shared and used. Many steps in the process are new to learners and educators wishing to capitalize on available materials. Quick-start guides and development models could provide the necessary know-how for selecting and using appropriate technology, project planning, pedagogically informed design, choosing licenses, translation and localization of resources, etc. There are also many free tools and services not necessarily specific to OER that could nevertheless be of benefit (e.g. Flickr, Google Video, Google Maps). It is important to evaluate these resources and promote their effective use for OER development and adaptation. In an effort to

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41   The continuing support through UNESCO of the work initiated by IIEP is
      promoting the development of an OER network (Editor).

educate and endorse best practices, it has also been suggested that sharing stories of user experiences, positive and negative, would enable a better understanding of the function and effectiveness of OER.[42]

Lastly, it is hoped that a DIY/DIT resource, through its community and initiatives, would inspire and generate more research and literature on Open Educational Resources. This is seen as one of the most important factors in building the critical mass needed to drive the OER movement and secure recognition of its value to the global educational enterprise.

4.   STRUCTURE AND ORGANIZATION

The underlying structure and organization of the resource should be simple and intuitive. This should be reflected in the navigational hierarchy, the search engine and the website map.

A DIY/DIT resource should be inclusive and committed to ethical practices. It must, therefore, be compliant with the web accessibility standards from the World Wide Web Consortium's (W3C) Web Accessibility Initiative. Compliance with other W3C standards, such as CSS[43] and XHTML,[44] is also encouraged, as well as consideration of some of the learning management system standards, such as AICC and SCORM.[45]

Ideally, users should have the ability to collect and organize content through personal user spaces and profiles. One goal is to create a flexible environment, capable of serving a diverse population of learners and educators. Allowing users to personalize content and services to suit their needs would be an effective way to make the resource more inclusive. The key to reaching as many users as possible would be to design a multilingual environment that offers mechanisms for users to translate content themselves.

As noted in the discussion on potential users, the content available through a DIY/DIT resource should be available for download to portable media (disks, USB devices, etc.), without any loss in quality. Colleagues from

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42   Stories have since been developed on the OER wiki, at http://oerwiki.iiep-unesco. org/index.php?title=OER_stories (Editor).

43   CSS (Cascading Style Sheets) is a W3C-endorsed style sheet format for HTML documents (web pages) that gives site developers and users more control over how pages are displayed. Using CSS, developers can create formatting and layout for a website independently of its content.

44   XHTML (Extensible Hypertext Markup Language) is the successor to HTML as the W3C standard language with which all web pages should be created.

45   AICC and SCORM are both collections of specifications that enable interoperability, accessibility and reusability of web-based learning content.

countries in the South underlined the importance of well-organized print materials, which may be the most usable media for learners and educators in remote areas. It is therefore important to incorporate mechanisms for easy conversion of content into printer-friendly formats. Audio cassettes should also be considered as an alternative to optical media for storage and dissemination of multimedia content, as many people in rural areas do not own computers or audiovisual equipment aside from cassette players. Even where computers and internet connectivity are available, use, as well as bandwidth, may be limited. This is something to consider when developing DIY/DIT resource content. Lowering bandwidth demand can be accomplished by using CSS, separating templates from text, and taking advantage of server-side caching.

Lastly, it is hoped that the resource architecture would allow users to contribute and collaborate on content easily. Wiki and blog structures are examples of best practice. It is imperative to the success of a DIY/DIT resource to involve its community in content development. Taking responsibility and ownership of the content should solidify the user base and ensure growth.

5.   UNDERLYING TECHNOLOGY

The conversation on technological solutions for deployment and management of a DIY/DIT resource naturally followed from, and built on, the many ideas put forth under the previous three topics of potential users, content and organization.

The ease of use and contribution of content referred to above means that users should be able to access and add to the resource through a variety of ways, which may include some or all of the following: support for multiple web browsers and operating systems, the choice of high- or low-bandwidth versions, syndication of content through RSS feeds,[46] including podcasts, built-in text editors and ways to import RTF[47] documents. An intuitive interface design would improve the quality of the user experience by reducing the steps necessary to engaging with, and contributing, content. Metadata also facilitate effective content use. Ideally, metadata should be assigned at

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46   RSS (Rich Site Summary, or Really Simple Syndication) is a format used to aggregate and distribute short descriptions of web content (e.g. news headlines or blog posts), together with a link to the full version of the content.

47   RTF (Rich Text Format) is a common file format used to transfer files between different word-processing programs, while preserving most of the formatting of a document.

the point of content creation and automatically harvested by the resource engine itself.

The sharing of content is a core element of OER practice, and it should be enabled on several levels. In an ideal scenario, a DIY/DIT resource would connect to existing repositories and portals for educational materials. This function, however, is dependent on the technological setup of such sites; so, as part of planning and promotion, the OER community would need to take on a leadership role in encouraging implementation of sharing protocols and services across the OER web landscape. Once a sharing standard has been agreed upon, content could be distributed through well-established peer-to-peer networks, such as Gnutella and BitTorrent. A less daunting objective is to enable searching of external collections of educational materials by way of metadata. There have been suggestions to work with major search engines, such as Google, on tagging educational content and offering a filtered search to that effect.[48]

In respect to offline use, one suggestion would be to enable delivery of the complete DIY/DIT resource on a CD-ROM. As the content is expected to grow and change, such a solution would need to incorporate an update engine or make it easy to download and integrate new materials. This could also work the other way round, allowing contributions from learners and educators in remote areas to be delivered on portable media and easily uploaded to the resource wherever internet access was available.

The community aspect has already been emphasized as central to development, collaboration and support. There are many technological solutions that support the creation of communities, and they should all be examined to determine which ones would best suit the needs of the DIY/DIT resource. Some of those needs are noted in the previous sections, such as setting up bazaar-style subject area 'stalls' and an OER matchmaking service. Effective mechanisms for managing shared documents are central to facilitating collaborative work, or a help-desk type of service, 'staffed' by volunteers, to facilitate support delivery. In the context of community development, it is important to understand the different kinds of communities, from theme-specific social hubs, such as IRC[49] chat rooms, to genuine communities of practice. Understanding how different types of communities deliver value to

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48   In fact, the William and Flora Hewlett Foundation is working with ccLearn (the education division of Creative Commons) and Google to build an 'open education web-scale search' (ccLearn, 2007) (Editor).

49   IRC (Internet Relay Chat) is a system that allows internet users to conduct online, text-based conversations with one or more other users in real time.

their members will facilitate the incorporation of a variety of methods for interaction and collaboration into a DIY/DIT resource.

In conclusion, acknowledging the 'open' aspect of OER, the community insisted on the use of existing free and open source technologies. There are many, and community members have already identified quite a few.[50] Nevertheless, the community still needs help in evaluating the ideas and suggestions outlined above, most specifically with regards to technological viability. For this reason, the OER community wishes to engage in discussion with their colleagues in the IIEP FOSS community, hoping that both groups can work together to make a Do-It-Yourself/Do-It-Together OER resource a reality.

REFERENCES

ccLearn. 2007. *Open education search*. http://learn.creativecommons.org/projects/oesearch/ (Accessed 12 October 2007.)

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50   References to specific technologies can be found in the summary discussion log, at http://oerwiki.iiep-unesco.org/index.php?title=DIY_Resource#How_should_the_DIY_resource_be_housed.2Fsupported.3F.

Chapter 7
FREE AND OPEN SOURCE SOFTWARE (FOSS) AND OER

In 2004, the International Institute for Educational Planning (IIEP) opened a discussion of Free and Open Source Software (FOSS) for education. The group elected to stay together as an informal Community of Interest and shared information on issues of interest from time to time as they arose. Because both the FOSS and the OER movements relate to the concept of open access, it could be expected that bringing the FOSS and OER communities together would result in a fruitful exchange.

First, the FOSS community was invited to reflect on lessons that they could pass on to the OER community and to identify FOSS applications that could be of use for OER. A four-week discussion ensued, and a report was prepared as a background note to share with the OER community. The discussion also resulted in an organized list of FOSS tools for OER development, management and dissemination that was made available on the OER wiki.

Next, the two communities were brought together for a discussion of the background note. About 200 members belonged to both the FOSS and OER groups, but the ensuing discussion assembled 700 individuals for the exploration of the topic over a two-week period.

PART I – AN INTRODUCTORY NOTE

Boris Vukovic with Claude Martin

1.   WHAT IS FOSS?

Free and Open Source Software programs are programs distributed under terms that allow users to use, study, modify and redistribute the software in any manner they see fit, without requiring that they pay the author(s) of the software a royalty or fee. Products such as the GNU/Linux operating system, Apache web server, Mozilla Firefox web browser, PHP programming language, MySQL database system and the OpenOffice productivity suite are all well-known examples of this kind of software. The FOSS movement grew out of the 1960s and 1970s 'hacker' culture, in which software code was passed freely among members of the computer science community, and as a reaction against the increasingly restrictive and proprietary nature of software development in the late 1970s and 1980s (Rasch, 2000).

FOSS is an umbrella term for two different but complementary philosophies: 'free software' and 'open source'. The former is championed by the Free Software Foundation, which was founded by Richard Stallman in 1985 to promote the rights of software through protecting four user freedoms:

- the freedom to run the program, for any purpose (freedom 0);
- the freedom to study how the program works and adapt it to your needs (freedom 1); access to the source code is a precondition for this;
- the freedom to redistribute copies so you can help your neighbour (freedom 2);
- the freedom to improve the program, and release your improvements to the public, so that the whole community benefits (freedom 3); access to the source code is a precondition for this (Free Software Foundation, 2007*a*).

For followers of the free software movement, protecting these freedoms is a moral and ethical imperative. The 'open source' philosophy, however, is rather more pragmatic: the term was introduced in 1998 in a bid to better market free software to the business community (Raymond, 1998). Open source advocates – notably the Open Source Initiative – emphasize the economic and technical benefits of making source code freely available:

> When programmers can read, redistribute, and modify the source code for a piece of software, the software evolves. People improve it, people adapt it, people fix bugs. And this can happen at a speed that, if one is used to the slow pace of conventional software development, seems astonishing (Open Source Initiative, 2004).

While the Free Software Foundation prefers a term that explicitly refers to freedom, the Open Source Initiative believes that the dual meaning of the English word 'free' (*gratis* and *libertas*) is confusing. Instead they place the focus on the availability of the source code, without which it would be difficult and inefficient – not to say practically impossible – to study, modify and improve the software.

More detailed, formal definitions for the terms 'free software' and 'open source' are maintained by the Free Software Foundation and Open Source Initiative. The definitions are substantively identical, however, and the decision to use one term over the other is generally ideological rather than functional. Stallman (2004) characterizes the free software and open source movements as two political camps within the same community. While the motivation of each of these two camps may be different, in practice they

occupy similar ground and often work together. For this reason it is helpful to have a common term – in our case, FOSS.

Is FOSS really free?

There are two senses in which FOSS programs are free: they have zero direct cost to the user, and they provide the freedom to study, modify and redistribute the source code. Most FOSS advocates emphasize the latter: 'free' means 'free as in "free speech," not as in "free beer"' (Free Software Foundation, 2007*a*). The importance of 'free' in FOSS is that software is 'unfettered' by copyright restrictions.

The FOSS model

FOSS is more than just a set of terms of distribution. It is also, perhaps primarily, a collection of tools and processes with which people create, exchange and make use of software and knowledge. And it is these tools and processes – the FOSS model, described by many as revolutionary – that may be of most interest to the OER movement.

2.   LESSONS FROM THE FOSS MOVEMENT FOR THE OER MOVEMENT

During the discussion of FOSS solutions for OER, the FOSS community highlighted a number of important points of convergence, as well as some distinct differences between the two movements. The FOSS movement benefits from many years of experience and practice, and the community put forward the following 'lessons' for the younger OER movement.

OER and FOSS are complementary

The fundamental principle underlying both FOSS and OER is the freedom to share knowledge – whether this takes the form of making software code open for collaborative modification and improvement, or allowing unrestricted access to learning resources.

The objective of widening access to educational materials by means of technology brings OER and FOSS into a complementary and potentially mutually beneficial relationship. It is the conclusion of the FOSS community that this relationship manifests itself on two levels:

- development of FOSS software tools to support OER,
- development of OER content following the principles of FOSS.

The following comments were made:[51]

> Definitely, in my view, free content cannot be developed in the absence of FLOSS[52] technologies. The reason being that free content must adhere to the principles of the free content definition – namely the freedom to use, distribute and modify the resource. The freedom to modify free content includes the requirement to be able to modify the resource with free software tools. We must also respect the choice of users to use proprietary tools for the modification of resources as long as these [are] saved using open standards.

> Many people have realized that higher education and the FLOSS movement share many values such as community work fostering the open development and exchange of ideas, peer review, etc. It came about that higher education might use an open source (FLOSS) metaphor or model when integrating technology for content development, management and delivery.

OER development can mirror and take advantage of the FOSS collaborative model

The Open Educational Resources movement holds undisputed potential. Although it may have significant advantages over FOSS, it also faces significant challenges in aiming to achieve the same degree of success:

- Contributions to OER can be made by a much broader and more varied community of educators, in contrast to smaller groups of software developers for FOSS.
- On the other hand, due to a more diverse population of contributors, the OER movement will face greater challenges in attaining the standards of efficient, structured, peer-reviewed, and self-organizing collaborative work that is characteristic of FOSS.

> The new frontier for OER development is to look for excellence through team-structured, peer-reviewed work, in collaboration, online, adopting/adapting methods and tools used for FLOSS development.

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51   Each of the indented paragraphs below and throughout the remainder of this chapter is a quote from an individual participant.
52   The acronym, FLOSS (Free/Libre Open Source Software), is preferred by some open source proponents; 'libre' avoids some of the ambiguity of the word 'free' in English (Editor).

> I expect that the uptake of collaborative authoring of free content will be revolutionary when compared to FLOSS – simply because there are more people that can participate. In the case of FLOSS, this is limited to people who have the necessary programming skills.

FOSS can promote creation of OER content in developing countries

In considering the software tools available for creation of open content, it is argued that developing countries in particular may play a leading role in promoting the integration of FOSS and OER development. Furthermore, FOSS projects supporting computer literacy (such as the International Computer Driver Licence[53]) open up opportunities for wider participation in OER development from poorly resourced areas.

> Many of the contributions from developing countries seem to suggest that, for large-scale, widespread usage in a country with not much funding, Microsoft is not within their budget – so they can only use those FOSS programs that are relatively low tech.

> Having main donors and development organizations using FOSS and implementing FOSS in developing countries should be a priority. We are not seeing enough engagement in that area. If big institutions were adopting FOSS, it would directly invite and convince local/national partners and official institutions to do the same.

OER developers should commit to open licenses

The success of FOSS can, in part, be attributed to an ongoing commitment to free licenses, which are essential for unrestricted collaboration and sharing, and lead to progressive development of the movement.

Faced with recent developments in digital rights management and patent submissions on learning management systems, the community wishes to stress more then ever the necessity of becoming informed about open licenses, such as those offered by Creative Commons. Open Educational Resources will be well served by licenses that provide legal support to the objectives of free and open access to educational materials through the provision of appropriate and realistic standards for their use, modification and distribution.

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53   http://www.acs.org.au/icdl/

However, exponential growth of free content will require an unashamed commitment to free 'copyleft'[54] licenses. This is something we have learned from the FLOSS experience – namely the essential freedoms that are protected. Deviations from these freedoms will stall growth of the free content movement.

There is an increasing awareness among participants of the OER initiative of the importance of choosing a license that meets the requirements of the free content definition (http://freedomdefined. org/Definition). This is a sign that the OER movement in education is maturing, because not all resources that are 'open' are free for reuse, modification and distribution.

Managing OER content design and editing is easier than FOSS programming

Unlike FOSS, the structure of OER content is more flexible and accommodating to a diversity of approaches. Contributions to open content can be accomplished with far fewer steps, compared to those of open source software. Wikipedia is a prime example of a content development platform that facilitates contributions without excessive reliance on technical expertise.

Free content is less demanding than the requirements of central control for maintaining the main code branch of a FLOSS development. Content is also far more tolerant of 'errors' – the application won't break because of a grammatical error. It is far easier to manage the versioning of content, as successfully demonstrated by the Wikipedia project.

More inclusive formats for document exchange should be used

Some practical advice was offered with respect to the production of open content using desktop publishing applications. OER developers now have more options for document production and exchange, with increasing interoperability among different formats. The open source OpenOffice.org

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54   A play on the word 'copyright', 'copyleft' is a form of licensing used to modify copyright to protect a user's freedom to modify and redistribute software or any creative work, including all future versions of that work: 'Copyleft says that anyone who redistributes the software, with or without changes, must pass along the freedom to further copy and change it' (Free Software Foundation, 2007*b*) (Editor).

(version 2)[55] is a step in that direction with the development of the OpenDocument Format (ODF) recently approved by independent standardization bodies.

> Frequently PDF is a more appropriate format than either [Microsoft] Office or ODF. The exception would be documents that you actually want the receiver to edit. You might use RTF [Rich Text Format] here.

> RTF is a proprietary format, but the format is documented and seemingly in the public domain. … Thus it might claim a role in OER if there is a need that other, more truly open, formats cannot fill.

> Another future solution is being visible through Web [2.0] solutions, such as Writely, which is a free tool enabling you to edit documents online, even in parallel.

FOSS can support better searching of OER

In anticipation of the proliferation of OER on the web, the FOSS community can provide recommendations and solutions for locating learning resources. The impact of OER is dependent on its visibility and accessibility on the web. Streamlining content development and distribution is one way that the FOSS and OER communities can work together to contribute to a more inclusive and open web landscape.

> The potential value of free content is enormous, but the problems of finding good, usable material are often overwhelming, and this is where innovative structures are urgently needed.

> Comment has already been made on finding and using learning objects – and the necessity for excellent search strategies so teachers can find existing stuff. That coexists with the challenge of the 'rate of content development': it doesn't necessarily follow that, because content is available free of charge, teachers will use it.

FOSS can ease concerns over perceived technical demands of OER development

The FOSS community acknowledged the wide-ranging technical skills of OER contributors, but recognized that many educators remain intimidated

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55   http://www.openoffice.org/

by computer environments and are sceptical about the value of technology to education. Recent FOSS developments, however, especially those grouped under the label of Web 2.0, offer increasingly accessible solutions for web-based content production and collaboration. Thanks to a more transparent production process and more flexible software that allows for innovation and creativity, new FOSS solutions may contribute to changing attitudes about the relationship of web technologies and education, thereby furthering the progress of the OER movement.

> There is a perception where I work in Australia that open source belongs to 'techos'; teachers would be interested in Open Source if it provided them with functionality or particular aids to learning that were not readily available, or more easily accomplished, with proprietary software.

> With the advent of social software, the entry barriers to participation are lowered. In comparative terms free content does not require a very high level of technical skill (for example, you can publish on the web using a wiki without the need to become proficient in XHTML mark-up).

There are differences between OER and open source software

FOSS and OER may share an underlying philosophy rooted in freedom of knowledge and education, but the nature of their content is distinctly different. In part, those differences are due to the largely subjective notion of the 'value' of an educational resource, as a function of its learning objectives, context, or subject matter. The establishment of quality standards for OER content is considerably more complex than for FOSS products. For OER practitioners, this can present a major obstacle to modelling the principles of FOSS development.

> The key distinction between open source software and open content is that the underpinning dynamics are very different. Open source software, if meeting a need, attracts a community which then fine-tunes and extends the code. It is possible for an application with, say, 20,000 lines of code to be reduced to 10,000 lines of code but have increased functionality. … In contrast, our human tendency with content is to not be so ruthless with a purge and replace approach. We simply add to it; and this, I believe, is a major challenge to the OER movement. How many repositories have you been to where you've searched through so much dross to find the good 'nuggets' that you've simply given up in despair?

3.   FOSS TOOLS FOR OER DEVELOPMENT, MANAGEMENT AND DISSEMINATION

The discussion in the FOSS community generated a large number of suggested tools for OER. These were grouped in the following categories, progressing from the most elementary to the most advanced:

- FOSS tools to design, edit and publish OER;
- FOSS tools to implement learning technology standards in OER;
- FOSS tools to design and implement learning object repositories;
- FOSS tools to design and implement virtual learning environments/ learning management systems;
- FOSS online collaborative environments to design, edit and publish OER.

Under each of these categories is a list of suggested software for OER identified in the FOSS group discussion and reference information:

- a brief description of the software (usually taken from the site),
- the direct link to the site.

As this is a very long document and intended as a reference, it is available on the OER community wiki.[56]

PART 2 – DISCUSSION HIGHLIGHTS

Boris Vukovic

1.   BACKGROUND

The premise of the joint FOSS and OER community discussion was that both movements share a common conviction that access to resources, whether software code or learning materials, should be free and open for use, modification and sharing. It was also hoped that the more mature FOSS movement would have valuable lessons to pass on to the newly developing field of OER. The organizers were not disappointed. Informed and inspired by the report of the FOSS community discussion, the participants enjoyed a rich exchange of ideas that produced several important threads of conversation.

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56   http://oerwiki.iiep-unesco.org/index.php?title=Appendix:_FOSS_tools_for_OER_development%2C_management_and_dissemination

These have been summarized below, under the following headings:
- comparable demands of development,
- development models,
- learning design standards,
- mechanisms for quality assurance,
- consideration of licensing choices,
- certification of competencies,
- levels of expertise and motivation to learn,
- the role of new generations of participants,
- learner-centred OER,
- print publication of OER.

2.   COMPARABLE DEMANDS OF DEVELOPMENT

During the discussion in the FOSS community, it was suggested that OER content management presents fewer technical demands than FOSS development. Responding to this in the joint discussion, some participants argued that, although the demands of educational resource development are of a different nature than that of FOSS, they are nevertheless comparable in their degree of complexity. Instructional design issues and production standards, such as adherence to learning design specifications, ensuring a high level of 'granularity',[57] and separation of content from presentation, present challenges that are equally demanding from the development perspective.

In fact, since the OER movement is still in its infancy, it is likely that many of the finer points are not yet fully understood by practitioners. In this respect, OER development may be a more difficult undertaking than following the now well-established path taken by FOSS developers. However, comparisons between the two movements have little practical use if conceived only in terms of the demands placed on their respective practitioners. It may be more helpful to examine the qualitative differences in the nature of each practice.

> I'm not sure it's necessary to determine whether things are 'easier' or 'harder' in the FLOSS or OER worlds, but as the previous messages … illustrate, there are differences, and understanding those differences will

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57   The term 'granularity' refers to the size of an educational resource (Wiley et al., 2000). The more granular a resource, the smaller the chunk of information it contains. For example, a single learning object, such as a graphic, is more granular than a complete course presented in a format that prevents its being broken down into its composite elements.

be important to applying lessons learned in the FLOSS community to OER. … In OER more significantly than in FLOSS, the production and distribution aspects of open sharing can be disaggregated. … Typically in a FLOSS project production and distribution are … tightly intertwined. The open distribution is what supports iterations (and thus production) by a wide community. There are certainly great examples of this happening in OER as well – Connexions comes to mind – but open sharing and open production need not necessarily occur together in OER.

3.   DEVELOPMENT MODELS

At the end of this forum, it may be beneficial if the forum summary included an outline of different development models for open-source educational resources, and comments (benefits, challenges, situations suitable for the approach, etc.) with each model. This information could be based on the various discussions that have taken place during this forum. Forum participants may want to add to this summary by identifying projects that use a specific approach so that those contemplating a project will have a person or organization they could contact for additional information.

The short time available and the large number of topics discussed meant that this suggestion was not acted upon. However, the joint community did identify two major approaches to OER development, termed 'cathedral' and 'bazaar.'[58]

A 'cathedral' model for OER development involves a highly organized, top-down structure that may require paid teams of experts to lead the development. OER projects such as MIT OpenCourseWare[59] and Open University OpenLearn[60] are some of the examples of this approach.

In contrast, in a 'bazaar' model, a basic FOSS architecture and tools are made available to potential OER developers with the expectation that the development will be driven by need and facilitated by support from the emergent community. Rice University's Connexions project[61] is one example of a grass-roots approach such as this.

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58   After Raymond (1999).
59   http://ocw.mit.edu/index.html
60   http://openlearn.open.ac.uk/
61   http://cnx.org

In reality, it seems that most projects fall somewhere in-between these two models, with institutional structures and staff in place to support development efforts, and plenty of room for spontaneous growth as a function of dedicated and innovative content developers.

4.   LEARNING DESIGN STANDARDS

The open nature of educational resources that are intended for modification and reuse stands in apparent conflict with the issue of standards for learning design. For this reason, the emphasis on pedagogical neutrality and flexibility of standards (such as that advocated by IMS) is noteworthy. IMS Learning Design[62] includes a set of specifications for describing the elements (including resources) and structure of any unit of learning. In fact, an awareness of standards is very important for OER developers, since they facilitate the transfer and reuse of educational resources across different systems.

Both the FOSS and OER communities recognized the importance of such efforts and raised the question of implementation of design standards for OER. The Learning Activity Management System (LAMS[63]) was singled out as a promising FOSS solution that allows for standardized development of collaborative learning activities. Its functionality and value to OER can further be extended through direct integration with Moodle,[64] a popular FOSS course management system.

> Pedagogic neutrality – as highlighted in IMS Learning Designs – is very much a necessity especially in the context of the changing perspectives on learning. In a teacher-centric mode of schooling … even if an individual teacher tries to go beyond the given framework, he or she is expected to then fall in line with yet another defined line of thinking – a beaten path. … LAMS seems to be a powerful and exciting tool especially for the teachers and facilitators of learning.

5.   MECHANISMS FOR QUALITY ASSURANCE

Quality assurance in OER is a complex issue. FOSS developers rely on technical operability as proof of the quality of their product. Educational content, however, may often be used in spite of any faults that it may have, such as inaccurate information or dubious pedagogical value. It is hoped that

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62   http://www.imsglobal.org/learningdesign/
63   http://www.lamsinternational.com/
64   http://moodle.org/

collaborative development and peer review could contribute to assuring the quality of OER content. In this respect, a high level of participation by all stakeholders, from learners to educators and administrators, is considered an important mechanism for quality assurance – an important lesson to be taken from the FOSS movement. At the same time, the group cautioned against efforts to regulate the quality of OER too strictly. It was feared that over-regulation and setting the quality bar too high could reduce levels of participation, effectively minimizing one of the mechanisms for quality assurance.

Those that support the self-regulation of OER took a different view on the issue of quality. They argued that quality resources would eventually rise to the surface of the OER pool thanks to global recognition of their educational value and as a result of their continued use, adaptation and modification. In this pragmatic model of OER development, quality assurance is less of a primary concern: high-quality resources will be those that withstand the test of time.

It should be noted that each of these approaches assumes a central role for the users of OER, who improve the quality of resources through the process of selecting, adapting and contributing them back to the global community:

> I agree quality is a strategic priority for those of us grappling with the promotion and sustainability of OERs. An interesting thought – I would far prefer access to a poor-quality free resource, which I have the freedom to modify and improve for the benefit of my community than for example, a high-quality PDF file that's locked down with a NC [non-commercial] restriction!

6.   CONSIDERATION OF LICENSING CHOICES

The above quote illustrates the strong emphasis that the joint FOSS-OER group placed on the critical importance of open content licenses, as well as their practical relevance to other aspects of OER, such as quality assurance. Licensing was also singled out as one of the areas in which the newer practice of OER can learn the most from the experience of the FOSS movement.

> Our students (and faculty) can now find a vast array of information (both high and not-so-high) quality on the web. But they cannot reuse most of these resources without getting permission from the author. Most faculty will not go through the effort to do this. While it doesn't solve all the problems, having an appropriate CC [Creative Commons] license on most content would go a long way towards encouraging the development/improvement of content.

Developers of OER content need to carefully consider licensing options and their implications, including those offered under Creative Commons.[65] It is through licensing choices that the future success of open content distribution, sharing and modification will be determined. As some advocates have argued, selection of a particular license clearly demonstrates the content distributor's commitment to the fundamental 'open' principles of the FOSS and OER movements. Not all license options support equally the notions of free and open content, such as is the case with the 'no derivative works' and non-commercial restrictions available from Creative Commons.

7.   CERTIFICATION OF COMPETENCIES

Once content has been developed via FOSS tools, structured according to learning design standards, peer-reviewed to ensure quality, and made open for further improvement with an appropriate license, stakeholders may begin to question whether OER should be used for accreditation of learning. This issue produced a heated debate, with the outcome being a clear distinction between certification of competencies and certification of content.

Certification of competencies is an area of growing interest, particularly in the domain of information technology. There are efforts to provide FOSS-based programmes in response to some of the leading commercial initiatives, such as the European Computer Driving Licence.[66] Such programmes provide certification of basic computer skills and software application specialization, and are seen as a promising alternative for poorly resourced areas. OER can be used to provide the content for training and testing and may therefore be considered an integral part of the certification of competencies based on FOSS.

In contrast, on the issue of certification of content, it was the consensus that this is both difficult to accomplish and highly ambiguous in principle. Participants argued that fluidity is a fundamental property of OER content, subject as it is to continuing adaptation and modification. This fluidity makes certification of content impossible in practice. Furthermore, certification was criticized as a bureaucratic practice that can be seen as evidence of little more than temporary familiarity with the specific requirements of the test taken, rather than any lasting knowledge or competencies. Taken further, it was argued that OER content should not be designed specifically for measuring business-centred competencies based on a limited set of skills.

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65   http://www.creativecommons.org
66   http://www.ecdl.com/

However, some participants presented examples of circumstances that do bring the issue of content certification to the forefront:

> In our OER project, we are developing courseware and assessments specifically designed for the New Zealand curriculum. There is a quality assurance process to ensure suitability; so, in that sense, it is certified content. … The original material is 'certified', which addresses return on investment issues with the funding body and our business need.

> In some contexts, the issue of accreditation of OERs will arise. For example, several African universities will be making use of resources that have been either co-developed (among themselves) or adapted from existing OER collections for use in their formal academic programmes. In cases like these, the university accreditation bodies will need to accredit the programmes (as they do any other).

In conclusion, a focus on the accreditation of programmes, rather than the resources themselves, was considered key to the resolution of the discussion on certification. It was also recognized that accreditation procedures are the domain of institutions. This suggests a possible issue for future discussion: the determination of institutional policies on the certification of OER-based education programmes.

8.   LEVELS OF EXPERTISE AND MOTIVATION TO LEARN

Development of educational resources in the form of digital learning materials requires a certain degree of technical skill and familiarity with the various FOSS tools available. Often, FOSS advocates assume that OER practitioners possess a reasonable level of technical expertise. However, for many potential content producers this may not be the case:

> Sometimes, working in the e-learning field, we can forget that many people have no knowledge of these tools and what use they might be for researchers and project development. We also forget that installing software – even modern, easy to use, web software – lies outside the experience of many users.

FOSS producers focus on software as the end goal of their work, while, in OER, content development software is a tool only. Clearly, the level of technical knowledge and proficiency demanded in these two contexts are very different.

In their initial debate, the FOSS community discussed the complementary nature of the relationship between the two movements. Some participants in the joint debate, however, expressed concern over their capacity to contribute to and benefit from such a relationship. It was suggested that potential OER developers should place themselves on an 'expertise continuum' and then seek the appropriate levels of technical training and support. Others argued, however, that technical familiarity could and would be acquired as part of the process of OER production, rather than through formal professional development. From this perspective, the issue is less about acquiring skills and more about motivation for continuous professional development and learning. Here the group stressed the need to uncover the motivational factors that contribute to the progress and success of long-running FOSS projects.

9.   THE ROLE OF NEW GENERATIONS OF PARTICIPANTS

Related to this issue of motivation was the observation that younger people, with their enthusiasm and capacity for innovation, are often the driving force behind many FOSS projects. The communities that form around FOSS initiatives often appear to be largely composed of young people. In contrast to traditionally more experienced commercial software (or educational content) developers, these developer/user groups contribute collectively to the progress of the project through testing, feedback and code modifications. Clearly, such communities change the nature of project development in FOSS by shifting the focus from individual professional expertise to a community's pooled knowledge and contributions.

The joint FOSS-OER group questioned whether and how the same generation of participants could be attracted and recruited for OER development:

> How welcome do we make most young learners (formal and informal)
> to participate in our current OER processes, especially as improvers/
> creators of learning material?

These learners, aptly referred to as 'digital natives' (Prensky, 2001), show tremendous skill in both using and creating with technology. If their abilities are not utilized as part of the OER community's efforts to take advantage of digital resources for education, new generations of learners could be further alienated from formal education. Greater involvement of young learners in the production of OER could have an additional benefit: it was suggested that the

FOSS and OER approach to content and software licensing could reduce levels of piracy and help to legitimize peer-to-peer sharing and distribution.

While the group acknowledged the potential benefits of attracting more young participants, it also stressed the importance of lifelong learning and warned against discriminating against older generations.

> I would like to add that age should not be a hindering factor in the concept of learning communities, and it has not been our experience that it is. Just a month ago, the Indian State of Kerala (my home state) completed a project of introducing computers to the elderly women from the rural – agricultural farming – areas. These new learners – mostly above 60 years – were not even literate in English. All of them were positive and were of the view that the training inputs will be useful to them.

10.   LEARNER-CENTRED OER

In line with current pedagogical thinking, OER developers need to place the learner at the centre of the educational process. It was argued that traditional didactic teaching practices do not work in the new digital age, with its increasing variety of media available to stimulate creativity and engagement. Instead, constructivist approaches to learning better reflect a reality of knowledge construction through the engagement between novices and more experienced users in communities of practice.

In terms of OER development, this approach means that learners themselves need to be given opportunities to contribute to learning resources. While the teacher was recognized as an important facilitator of this process who, by virtue of professional experience, can provide scaffolding and guidance, the students should play a key role in shaping classroom materials and learning resources. It was expected that the value of OER would increase through genuine student use and modification. The FOSS movement may contribute to this process of real-world OER validation by providing tools for student expression.

> Yes there is always a role for lectures and seminars, and teachers have an important role in supporting learning. But the focus should be on tools for learners, not just platforms for teaching, to express themselves in whatever media they feel comfortable in – including blogs and wikis, podcasts and videos – and to collaborate and share their stories.

11.   PRINT PUBLICATION OF OER

The educational publishing industry is another domain in which the OER and FOSS movements can facilitate a change in established practices. Strong arguments were made in favour of developing and using Creative Commons-licensed learning materials as an alternative to commercial textbooks, which are becoming less and less affordable, even to learners in developed countries. In addition to the financial advantages to the learner, so-called 'open' textbooks give teachers the freedom to customize the material to better fit their own course design and teaching situation. This also resonates with the constructivist pedagogy mentioned in the previous section. In contrast to the course coverage being determined by, and following, fixed and segmented subject matter in a commercial textbook, an open textbook can be continuously modified to accommodate changing classroom and learner dynamics.

At the same time, it is likely that such a change will face great political opposition from the publishing industry. Strong advocates will be needed. However, it is hoped that educational publishers will realize the necessity for change as traditional textbooks lose their formerly privileged position as key sources of factual information. Web-based projects – such as Rice University's on-demand academic publishing initiative, delivered through Connexions[67] – may be in their early days, but they are gaining much publicity.

> FLOSS and open content movement are slightly shaking the boat of the educational publisher. There is a real fear that the role of the publisher in the value chain will change. It looks that what is left for the publishers is the editorial work and marketing, as the actual content creation and distribution will be done online (Leinonen, 2005).

12.   GENERAL CONCLUSIONS

The joint FOSS and OER group addressed a number of issues by drawing on the experiences of the FOSS movement and examining their relevance and value for emerging OER practice. From these deliberations, some general conclusions can be made in the form of lessons learned from FOSS and best practice for OER development:

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67   See http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=8672&S nID=90828 for more information and http://cnx.org/content/col10376/latest for the first book delivered through the service.

- Development structure is characterized by both top-down and grass-roots approaches, each with unique roles – the former contributing institutional support and infrastructure, the latter providing the impetus for creative growth and progress through innovation.
- Communities are hubs for collaboration and project sustainability, driven by enthusiasm from novices, and by the knowledge and maturity of more experienced members.
- Project development is meticulously documented and quality is ensured through modular peer review, facilitated by the high granularity of content.
- Standards exist not to prescribe development, but to ensure interoperability and exchange.
- Innovation is a response to a need, a personal 'itch' that transforms into a collective undertaking.
- Licensing choices ensure commitment to the principles of openness and freedom of knowledge and resources.

While the OER movement will certainly face unique challenges in the future, the knowledge and experience shared by FOSS practitioners is of undisputable value. The joint FOSS-OER group discussion produced a number of important conclusions as outlined above, covering most aspects of OER practice, from content development and learning standards to the questions of quality and expertise through community participation. It is hoped that the FOSS and OER movements will utilize the potential of existing and developing technologies, to collaborate closely to make education more accessible worldwide. By bringing together hundreds of professionals from around the world to deliberate on issues of importance to both movements, this internet-based discussion was a strong affirmation of this conviction.

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