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Behind the Scenes with OpenLearn: the Challenges of Researching the Provision of Open Educational Resources

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Abstract: Web-enabled technology is now being applied on a large scale. In this paper we look at open access provision of teaching and learning leading to many users with varying patterns and motivations for use. This has provided us with a research challenge to find methods that help us understand and explain such initiatives. We describe ways to model the research and identify where pressures and contradictions can be found, drawing on a reflective view of our own practice in performing the research. Open educational resources are defined as technology-enabled educational resources that are openly available for consultation, use and adaptation by users for non-commercial purposes (UNESCO, 2002). OpenLearn is one of the largest of such initiatives and is committed to the provision of open educational resources for all. It is being developed by The Open University and is primarily sponsored by the William and Flora Hewlett Foundation. It provides users with over 4 200 hours of higher educational material drawn from Open University courses. Other learning tools such as discussion forums, video conferencing, and knowledge mapping software are also available to the user. In this paper we aim to introduce OpenLearn and outline some of the main research issues surrounding such an initiative. We seek to explore theoretical and practical approaches that can provide suitable tools for analysis. Activity theory is seen as a suitable approach for macro analysis and its use is illustrated in terms of the complexity of large scale research. Activity theory, besides informing research perspectives, can be turned in upon the research process itself allowing us to consider the challenges and context of the research. By using activity theory in this way and illustrating from a range of practical approaches we demonstrate and illustrate a useful research approach.

Keywords: e-Learning, open content, tools, action research, activity theory

1. Introduction

Open educational resources are defined as technology-enabled educational resources that are openly available for consultation, use and adaptation by users for non-commercial purposes (UNESCO, 2002). The internet has recently seen an increase in such initiatives the range including areas such as MIT OpenCourseWare, CORE (China Open Resource for Education), Wikipedia, OpenLearn and OpenCourseWare Universia. Key features of many of such initiatives include the provision of course content, the ability to adapt, use and develop content, the availability of social learning tools, and the introduction of other learning tools. The range of initiatives is illustrated by the membership of the OpenCourseWare Consortium (<http://www.ocwconsortium.org>) which has members from a diverse number of countries.

The impact of these resources and changes in the ability of individual users to access such educational materials is likely to impact significantly on how people learn. The confinement of knowledge to educational institutes is likely to be challenged. Alternatively, new power structures may arise as a result of 'big players' dominating the open resource markets. The question arises as to how these open resources will impact on the learning of individuals or groups of learners. Will these resources empower learners and how will learners' experience change? Coupled with the advent of open resources there is also the development of new software and hardware tools such as software that supports social learning and mobile computing that may change the possible affordances of such technologies. For instance by combining wireless connectivity with mobility the ability to access information when wanted becomes more achievable. OpenLearn (Figure 1) is a major open content initiative funded by the Hewlett foundation and The Open University. The project was officially launched on 25 October 2006 and currently provides over 4 100 hours of university level material for personal study. The material used in the LearningSpace is currently derived from Open University course material. This has been quality assured and is currently in use or has been used within Open University validated courses. The conversion of this material into an appropriate provision for OpenLearn was conducted using an 'integrity' model where the content is kept as close as possible to the original source material with adjustments made relating to presentation on the web, rights issues, and reshaping for a wider audience. These units of study are located within an area of the OpenLearn site known as the LearningSpace. The LearningSpace also allows users to keep journals relating to their activity and to participate in forums relating to each of the units.

Another area of OpenLearn is known as the LabSpace. This space is envisaged as being more experimental and developmental in nature. It is possible for users to download existing content, edit, modify or add to it and upload it as a new version. Educational materials from the Open University's archives are also made available within this space. These materials may be re-worked or re-versioned by users. Users are also able to upload their own course materials into the LabSpace. If the material is suitable it may then be transferred across from the LabSpace into the LearningSpace. The LabSpace contains a number of tools that might be used to help learning, or help a course developer. Compendium is a mapping tool that can be used to help in planning and structuring courses but can also be used for other applications such as mind mapping, concept mapping and the development of integrative diagrams for research. FlashMeeting (Figure 2) is a video conferencing tool that allows a number of participants to interact. It uses a low but useful video frame rate allowing a better audio reception over normal web connections. The OpenLearn servers can cope with up to 100 different users simultaneously, or 50 meetings with two individuals. FlashMeeting is a one click videoconferencing tool and does not need to be installed as long as the free Adobe Flash Player runs on the web browser. The tool uses the 'simplex' or 'push-to-talk' audio tool allowing only one to be broadcasting sound at any one time which is ideal for interviews and multi-party broadcasting. The conferences are recorded remotely and may be viewed privately at a later date or made available to the world at large. The LabSpace also includes a chat tool, MSG, which is a text driven messenger.

The roles of the LearningSpace and LabSpace and their inter-relationship are in a state of continual evolution. Recently, for instance Compendium has been additionally made available in the LearningSpace. Once a course has been uploaded to the LearningSpace the link to each course is relatively stable although at a later date a course may be replaced, updated or moved to the LabSpace. FlashMeetings can be booked at any time via the relevant link within the LabSpace. All FlashMeetings are permanently recorded and are either restricted to a group designated by the users, or can be made open to the public. Users can provide links directly to their recorded FlashMeeting without having to go the main OpenLearn site. A number of forums exist attached to the subject areas. These are readable for all and writeable for OpenLearn registrants. Some of the tools such as MSG (chat) are currently restricted to registrants only.

A typical user might enter the site and decide to enrol on a unit. Each unit would take between and estimated 3 to 15 hours of systematic study. At the time of writing there were 352 units in the LearningSpace of OpenLearn. Examples of units include; French: Overture, Knowledge Mapping, Understanding Operations Management, The Meaning of Home, and Earthquakes. Many users will dip into the units, reading some bits and skimming others. Others might focus on tool usage, social learning or using and drawing from materials for teaching purposes.

The servicing of OpenLearn and its maintenance is funded by the project grant from Hewlett Packard and the Open University. One of the main themes of the research is how to sustain the project beyond the end of this funding.

2. OpenLearn – The research challenge

OpenLearn is a large project with a dedicated research team consisting of three individuals involved with research and evaluation. A significant proportion of the project budget has been set aside for research. Besides this dedicated research team others within the project have research interests including academics responsible for the transformation and development of content, and those involved with the research and development of software tools. The project as a whole is viewed in terms of an action research model where the results and impacts of research are fed back into project development. Within this paradigm there is also the challenge and the tension between academic research requiring high degrees of rigour and having underlying theoretical aims and that of applied research with the requirement of fast-feedback and relating more to the success of the site via such issues as marketing, usability studies, site design etc.

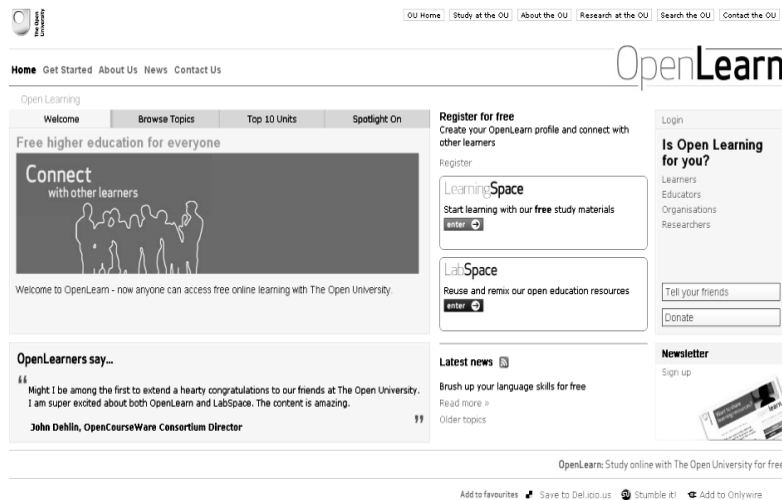


Figure 1 OpenLearn Home Page giving access to LearningSpace and LabSpace (viewable at <http://www.open.ac.uk/openlearn>)

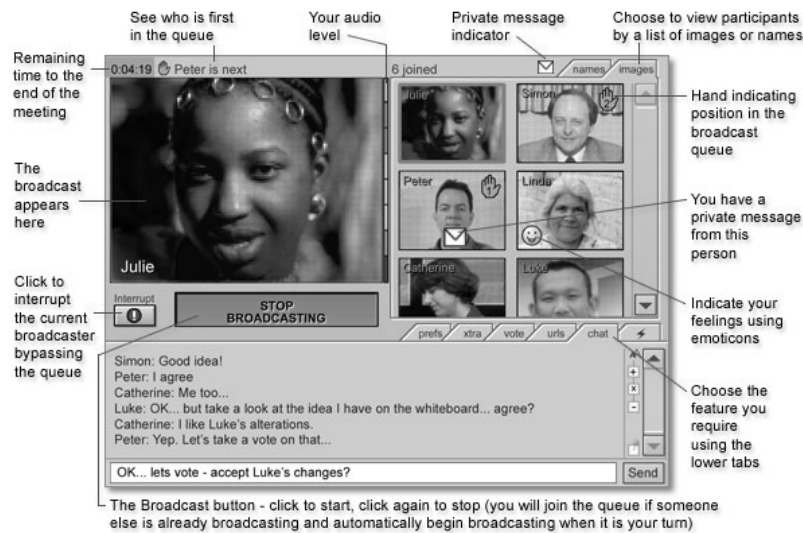


Figure 2: FlashMeeting Conference Interface – this resource is freely available in OpenLearn simply requiring a WebCam and a headset from users. (viewable at <http://labspace.open.ac.uk/course/view.php?name=FM>)

In addition to team members and their research interests other sources of research input have been used. This has included the formal employment of university expertise for usability studies and the help of PhD students. Non-formal sources of research input have included voluntary interactions with the OpenLearn team and academic input from the wider community. This community includes those with expertise in eLearning, many within the university, who may share formally or informally in the development of the project. Further afield there is the impact and influence of the education research community, especially in relation to eLearning, and the OpenCourseWare Consortium that provides a structured working environment and opportunity for the coming together of various open content providers.

Researching such a large project involves examining several different areas, each of which presents its own set of challenges. The four main strands of research include; teaching with OpenLearn, the users experience, project development, and sustainability. To this we can add a meta-layer; the challenge of researching open content. This paper is chiefly concerned with this objective and aims to illustrate our own problems and dilemmas in conducting such research and by offering our insights into models of research provide a guide for others in research techniques.

An idealised approach to the research has been to:

1. identify and develop theoretical frameworks for analysis at macro and micro levels
2. find tools and ways of mapping and talking about our research

3. develop and find appropriate methodologies to enable us to collect and process research findings

This list may seem very logical and structured as presented here but the evolution of the framework, as we learn within an action research paradigm is more haphazard and iterative in nature. A research technique is seen not as something developed in advance but rather as something in the process of development with continual trials, implementations and reworking. OpenLearn itself is a continually evolving construct and this presents an additional challenge to research. The three approaches listed above will be described in more detail with specific reference to research within the project and also to researching users' experience.

2.1 Developing theoretical frameworks of analysis at the macro and micro levels

2.1.1 Action research

One possible criticism of academic research is that the impacts of such research often have little effect on practice. A possible reason for this may be the divide that exists between the world of academia and the world of work. The process of academic research can be very slow with the major outputs often consisting of writings in journals for an academic audience. Research is often conducted from 'afar' that is, it is separate from the object of research. An advantage of this is that research is more likely to be independent if not connected to the object of the research. This independence and objectivity is unlikely to be untainted in that research and researchers are embedded within research paradigms, personal social-cultural influences, and the influence of the grant holders who partially or wholly shape the research questions. The principles of action research call for a research process that involves change within that which is researched (Greenwood et al 2006, Somekh 2006). In a sense it is more of an experimental 'trial and error' process in that it is iterative, ongoing and affects change in practice. It can therefore be seen as a process of reflection and practice, often referred to as praxis. In order to affect action research it is necessary to

1. involve more of the organisation than simply the dedicated researchers,
2. to integrate the results of the research into decision making at managerial levels.

Dangers exist however when moving towards a culture of 'self-development' where Action Research is seen as an efficiency tool as opposed to its more idealised aims of democratisation, development and empowerment of workers (Greenwood et al, 2006). There are also dangers when research is taken out of the hands of research savvy practitioners and placed in those of research novices. Hence there may be many models of action research adopted according to one's perspective. Another key issue of action research is the 'social-technical' view which sees the successful development of any organisation being an integration of the right social and developmental environment with the use of appropriate tools. For example, the use of tools for doing research and for enhancing interpersonal communication within the research community and others in the organisation is part of praxis resulting from the research itself. Action research can provide us with a framework of research at the level of OpenLearn as an organisation but also as a framework of reflection and practice within the Research Unit. In this case we see this as a way of developing ourselves as individuals and as a team allowing an exploration of ways of working and knowing. Somekh (2006: 7) says:

'The self of the researcher can best be understood as intermeshed with others through webs of interpersonal and professional relationships that co-construct the researcher's identity'

In this sense action research is about both personal and professional development.

2.1.2 Activity theory as a way of modelling macro behaviour

OpenLearn represents one of the largest educational interventions on the Internet and as such the opportunity exists to understand how this operates and develops at a macro level. Possible contenders for analysis include activity theory and actor network theory which allow potential ways of understanding macro-behaviour. Actor Network Theory (ANT) focuses on identifying the various actors in a social organisations and examining the relationship between these actors (Latour, 2005). Activity theory focuses on action as it is mediated by tools within a socio-cultural context (Cole and Engeström, 2003). It was used as an analytical framework in this instance because of its educational applications including learning in organisations and that ANT was felt to be less clearly structured as an analytical tool.

The foundation for Activity Theory comes from the Vygotskian view that all action is mediated by tools whether these be external or internal, concrete or psychological (Vygotsky, 1980). This has been developed into concepts such as 'person plus' and cognition as a distributed activity located within a social group and

the tools that they use (Perkins, 1993). Leont'ev, a prodigy of Vygotsky, explored the way in which this could be applied through emphasising the activity as the main unit of analysis (Kaptelinin and Nardi, 2006). Engeström extended the framework and the subject-tools-object model to take into account aspects of the context within which such action was taken (Cole and Engeström, 1993). He represented the inter-relationships between these contextual elements within a triangular structure each node representing some aspect of interaction. The additional contextual nodes that he added were 'rules', 'community' and 'division of labour' (Cole and Engeström 1993, Kaptelinin and Nardi 2006). This framework was adopted as a practical tool of analysis since it could be applied to view OpenLearn from any number of different perspectives. These different perspectives could then be contrasted, reflected upon, or pushed against each other to force the identification of characteristics within each perspective and various 'contradictions' that existed between such perspectives.

Figure 3 demonstrates the use activity theory as a way of viewing the Research aspects of the OpenLearn. Researching such a complex and large educational initiative provides many opportunities and areas for potential study and often these are driven by project aims. These aims can be envisaged as being part of the rules in which the research is located and represent rules embedded in project design. Other rules are external to the project and include guidelines for general social research. These deal with issues such as research ethics which can sometimes create tensions in terms of the need for fast feedback and the drives for 'interesting stories' that may come from other parts of the project such as marketing, or management. 'Rules' may also relate to perceptions of individuals within the team (i.e. not formally held or shared rules) and relate to theoretical perceptions and opinions on the nature of good educational practice. Much research demands a certain standard of rigour (lower risk of error) which might create contradictions with the need for quick feedback (higher risk of error) to help move the implementation process forward. This contradiction highlights a general problem of the slowness of academic research to reach and inform its intended audience. By identifying and recognising this contradiction ways can be investigated for disseminating research internally in order to quickly feedback into the implementation and adaptation processes.

When examining Figure 3 contradictions maybe analysed within the structure itself e.g. between the research interests, motivations, and perceived views of the team players, between individuals and rules, about the essence and nature of research itself, about the choice of methods to monitor the learning effectiveness of OpenLearn. Contradictions can also be viewed of as occurring across different perspectives. For example a contradiction may exist between the need for neutrality and a critical approach of the researchers within the research perspective and the need for promotion and publicity within a marketing perspective that is directed towards gaining the attention of users.

2.1.3 Activity theory and action research

It is clear that Action Research and Activity Theory can be used effectively together. As Somekh (2006: 22) says when talking about Action Research,

'...activity theory is particularly helpful because it gives priority to collaborative decision making on the basis of sharing knowledge about identified 'contradictions'.

The socio-technical aspects of action theory can be related to aspects of tool mediation and the development of community. Activity Theory can be used to identify contradictions and these can be used to implement change. Such change might create new contradictions but through the iterative process of action research improvements can be made. A multi-perspective approach can be used to inform those working within OpenLearn to affect change. The challenge of how this dissemination occurs is something that needs to be addressed.

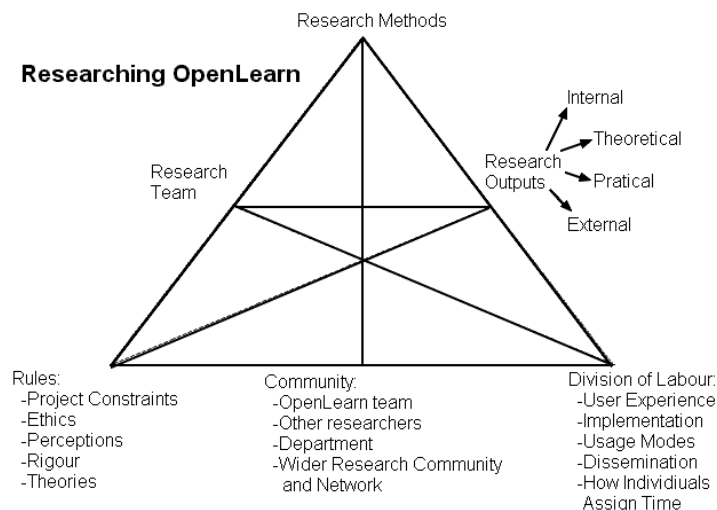


Figure 3: Using activity theory to represent the research perspective within OpenLearn

2.2 Tools for mapping and talking about research

Taking into account the socio-technical aspects of Action Research and the central role of tools within Activity Theory the development of various tools for thinking, analysing and describing is a key part of our research process. With such an array of available media there are difficulties in identifying the most suitable way or ways for research discussion and dissemination. The development of a research community that allows the findings of OpenLearn to be discussed and disseminated can be seen as a good area for the application of action research. It can mean experimenting with different tools and the construction of different types of space. In discussing and disseminating research findings a number of technological options present themselves as possible platforms e.g. blogs, wikis, editable web sites and facilities which can be found in the LabSpace. Within the LabSpace there is the opportunity to create discussion forums around research issues. These forums can be opened up to anyone. Also we can provide our own research space within the LabSpace. Individual and collective blogs can also reveal insights into research and development of OpenLearn and open content as a whole. Linking and exploring blogs can be of value as a research activity. An example of a blogged resource open to all is that of the 'OpenLearn2007' (2007) conference held at the Open University, Milton Keynes. Each of the presentations was informally blogged by attendees and the blogs made available to the world at large.

Compendium is an example of a software tool available within OpenLearn that can allow the development of concept maps, integrative research diagrams and help to structurally organise and develop courses. As a tool within OpenLearn it is still undergoing development. Any type of mapping allows the user to present in a way that combines text and graphics in a visual dynamic that can represent various structures, concepts and their relationships. They thus exist as a tool allowing users to reach beyond the limits of the mind in terms of its cognitive load. Although compendium has some limits compared with pen and paper it has affordances in that it is editable, re-mouldable, non-linear, allows multidimensionality, nesting and layering, allows links to other technical resources such as web pages, documents, images etc. It can also be shared dynamically between teams and individuals. Such a tool can allow us to model research complexity and represent discussion around theoretical issues.

2.3 Developing appropriate methodologies

Researching OpenLearn is a complex phenomenon and various tensions exist internal to the research perspective in such issues as:

- tensions between pedagogical paradigms
- intrusiveness of research methods
- nature of sampling and reaching hard to reach groups
- speed of research feedback
- choosing suitable analytical techniques
- dissemination methods

- nature of research tools used
- dealing with a non-homogeneous user base

As an example we can look at one of these issues in more depth. One of these is the fact the user base appears to be very heterogeneous and heavily skewed in terms of time spent on the site toward the low user. This pyramidal structure in terms of the time spent visiting a site is probably a common occurrence in many web sites although comparative studies are difficult because open content sites may differ greatly in form and function. Every website is in a sense competing against a large number of other sites in terms of grabbing a person's attention and part of the decision that people make in spending time on a site is their initial perception of the site's value. This can very much depend on how the home page of the site is presented and whether the site gives a clear indication of what kind of content or activity that it might contain.

A major challenge is to find out about the user experience. Questions relating to this challenge include:

1. how does the use of OpenLearn fit into the wider context of the user's formal and informal learning context?
2. are users learning from OpenLearn? If so how are they learning?
3. are users engaging and using the tools? If so what are they using the tools for?

Although there have been over a million discrete visitors to date the median estimated dwell time is relatively short with a heavily skewed distribution. For example about 50% of registered users have spent less than 30 minutes on the site in total although some 10% have spend more than four hours on the site in total. Does this mean that we should assume that the users with low dwell times are simply browsing and not learning much? Or might they be picking up small chunks or bits of information? The challenge of finding out about the 'fleeting' user is different from that of finding out about the more substantial user. Distinctions will also exist in terms of types of users. Users are able to freely re-use the material and republish under the commons license although it is a small minority who may need or want to do so. A teacher may draw from OpenLearn content to use in their teaching. Teachers and academics may wish to edit and change content which they are able to do in the LabSpace. Others may be interested in joining in the OpenContent research participatory groups or forums to discuss the research and development of open content and open educational resources. Learners may primarily study or use content but others may engage with social learning or using OpenLearn tools. Part of the challenge is to identify the types of user.

One possible means of tracing the user's experience is by using website logs. Generally one can infer whether a user was browsing, skimming, downloading or printing content, or systematically studying or reading parts of a unit. This however does not tell us about what the user is learning and with OpenLearn it is not possible to use pre- and post-study tests since learners will often not be studying a unit as a whole. In this instance thinking of the units as courses is inappropriate since this implies a journey from a starting point to an end point, and an externally structured pathway through the material often with some form of assessment. Identifying learning therefore depends on the unique experiences of users and needs to be process orientated. In order to get at the experience of users and the process of learning qualitative studies can provide a rich picture and thick description of users' experience. There are also several technological tools that can help the researcher in this process although there is always the problem of the degree of intrusiveness in any research exercise.

One method of examining whether learning is taking place is by in situ observation and making inferences from user activity. Getting users to think aloud and to record their thoughts can help in this although there are disadvantages to this technique. Another is by using interviews where a user's learning experience can be examined. Simple questions such as 'What have you learned?' or 'What have you found out that you didn't know before?' can act as the basis for more probing questions perhaps relating to a range of skills within Bloom's taxonomy (Bloom, M. et al 1956). A problem of such interviews is that they can become an additional form of teaching in that by causing the participant to recall or reconstruct their experience one is actually changing and reshaping it. Thus the research is adding to the learning experience.

Remote monitoring can allow a clearer insight into the actual live experience of the learner. This can be achieved in a number of ways. One such method has been co-developed with a volunteer who has been examining how to change and modify unit content within the LabSpace. This involves downloading pre-existing content, modifying and/or adding to it, uploading it back into the LabSpace as a new version. The research process began with communication using email and a FlashMeeting interview (a free video conferencing made available within the LabSpace) where a fairly open ended task was set up. This involved

downloading one of the units from the LabSpace and making adjustments to the unit and adding to it i.e. 're-versioning' the unit.

Jane, the volunteer, was given a series of options for recording her activity including the use of a video camera, digital camera with video capability or using CamStudio™ an open source facility that records screen activity and audio. After trying all three methods she decided to use CamStudio™. This allows screen activity to be recorded but also allows the user to make a simultaneous voice over commentary. Jane made three recordings showing the process of downloading and uploading the materials and the difficulties that she encountered. This provided a useful insight into the problems of uploading and downloading content. These technical difficulties were reinforced from some data based on email questionnaires that had been given to a wider sample of users, some of whom had attempted to try to modify or upload material. Although Jane represented a potential content producer, as opposed to learner, it demonstrated the successful application of a remote monitoring technique, although admittedly she had a certain level of technical expertise in that she could handle the installation and running of CamStudio™. After the exercise she was further interviewed about her experience using FlashMeeting. The greatest benefits of this research were in terms of feedback to the team to help in the development of OpenLearn (as a form of action research) rather than in exploring theoretical and academic issues. However, in terms of the personal development of team members it helps toward developing ways and thinking about issues of monitoring remote experience.

Other possible remote monitoring tools exist and in praxis we will experiment with various techniques to find those that work best.

3. Discussion

OpenLearn represents one of the largest developments within the open content community and presents a challenge for research. This challenge exists within four strands; teaching with OpenLearn, the users experience, project development, and sustainability. In this paper we have indicated and discussed the use of action research and activity theory as tools to enable us to think and understand the dynamics of a large educational initiative. Action research can potentially allow reflection, action and change within such a project. Activity Theory represents a tool for recognising areas for action and change and communicating issues to the project team. It also allows us as researchers to inwardly analyse our own behaviour and help in our personal and professional development.

As researchers there is the need to disseminate internally and externally the research findings to inform change. The development of communication tools and the novel use of technology to do this is considered an evolutionary process, one of trial and error, experiment and change. Providing useful research networks and integrating with others is important in the social construction of knowledge and understanding about open educational resources. How to use tools such as videoconferencing (FlashMeeting), blogs, and dedicated website space effectively is a challenge and an important part of our own iterative process of development within an action research framework. Reflecting on our own research practice can be considered a meta-research process.

Some of the research challenges of finding out about users' experience have been illustrated. Possible technological tools that can help in this process have been discussed. A consideration of the use of tools as appropriated by individuals is a characteristic of the socio-technical view of action research. We have considered researching OpenLearn in terms of a number of different perspectives and themes. A three level approach has been presented. At one level OpenLearn can be viewed using activity theory to shape various perspectives and then examine intra-nodal and extra-nodal contradictions between the perspectives. At the level of the community of researchers there has been a consideration of the sharing and dissemination of knowledge and the tools that can aid this process. At the third level there has been a consideration of the challenge of developing research tools using the iterative processes of action research where, as in Engeström's (2005) ideas of expansion, people, tools and community are in a constant state of change.

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