Student perceptions of the reuse of digital educational materials: A case study of the social outreach group SHAWCO

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Abstract

This thesis is founded on the rapidly emerging opportunity that our society has been presented with; an opportunity to increase access to education throughout the world using information and communication technologies. Up till now the open education movement has seen strong growth in the supply side of open educational content, but an understanding of how that content may actually be useful to organizations has gone largely under researched.

This case study explores the perceptions of six students participating in a volunteer social outreach project at the University of Cape Town in 2011. The students are volunteers in the Students' Health and Welfare Centres Organisation (SHAWCO) that has a vision to improve the quality of life of individuals in developing communities by increasing access to education. Through a curriculum development workshop and a series of open ended interviews, the students reflect on how they use and reuse digital educational resources and share some of the challenges they experience in curating and reusing educational resources for use within SHAWCO. Additionally, a newly introduced online curriculum database shared by all curriculum stakeholders is explored, with a focus on how the system facilitates materials' reuse. The collected data is analysed qualitatively within the framework of an activity system (Engëstrom, 1987) and the primary systemic tensions are discussed using the concept of contradictions.

This study has exposed some of the tensions regarding how the rules, community, division of labour and technologies are perceived and impact upon individuals practice in this context. This study has reinforced that it is largely human and institutional factors which are limiting some of the potential afforded by new technologies and the OER movement.

Keywords: Open educational resources; social outreach; Students' Health and Welfare Centres Organisation; Reuse of learning objects; Curation; Activity theory; Digital copyright

Compulsory Plagiarism Declaration

This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.

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Acronyms

BBM	Black Berry Messenger
ICT	Information and communications technology
IEEE	Institute of Electrical and Electronics Engineers
LMS	Learning management system
LOM	Learning Object Metadata
MIT	Massachusetts Institute of Technology
OCWC	OpenCourseWare Consortium
OER	Open Education Resources
PDF	Portable Document Format
PRAESA	Project for the Study of Alternative Education in South Africa
REC	Research Ethics Committee
SHAWCO	Students' Health and Welfare Centres Organisation
UCT	University of Cape Town
UNESCO	United Nations Educational, Scientific and Cultural Organization
WAV	Waveform Audio File
XML	Extensible Markup Language

Table of contents

1 Introduction 9
1.1 Overview 9
1.2 Focal research question/problem 10
1.3 Rationale 11
1.4 Theoretical framework 11
1.5 Introduction to the research design 12
1.6 Thesis structure 13
2 Literature Review 15
2.1 Introduction 15
2.2 Exploration of Concepts 15
2.2.1 The origins of reusable learning objects and the development of OER 15
2.2.2 The emergence of Creative Commons licensing 16
2.2.3 Open Educational Resources 16
2.2.4 A new resource for educators 18
2.2.5 Reusing educational materials in a digital world 18
2.2.6 Schooling in South Africa 19
2.2.7 The nature of social outreach groups 21
2.3 Challenges to the reuse of digital educational materials 22
2.3.1 Introducing the challenges to materials use 22
2.3.2 Resource context 23
2.3.3 Ease of adaptation 23
2.3.4 Issues of copyright 25
2.3.5 Resource curation 26
2.3.6 Need for well documented teaching practices 28
2.3.7 Pride of authorship 29
2.3.8 Educators' autonomy 29
2.3.9 Educators' availability 29
2.3.10 Technological affordances 29
2.3.11 Summary of reuse issues 30
2.4 Methodologies employed in similar studies 30
2.5 Theoretical underpinnings of related studies 31
2.6 Theoretical framework for this study 33
2.6.1 Collective activity in social context 33
2.6.2 The structure of activity 34
2.6.3 The activity system 35
2.6.4 Contradictions 38
2.7 Conclusion 38
3 Research methodology 39
3.1 Introduction 39
3.2 Research approach 39
3.2.1 Site selection 40
3.2.2 Participant selection 40
3.3 Research methods 43
3.3.1 Curriculum workshop 43
3.3.2 SHAWCO curriculum database 43

3.3.3 Semi-structured interviews 44
3.4 Data collection 45
3.5 Data analysis 46
3.5.1 Data analysis technique and process 48
3.6 Dealing with validity 55
3.6.1 Dealing with bias 55
3.6.2 Capturing "rich data" from the interviews 55
3.6.3 Respondent validation 55
3.6.4 Dealing with reactivity 55
3.6.5 Triangulation of methods and people 56
3.7 Research ethics 56
3.8 Summary and emergent issues 56
4 Findings and discussion 58
4.1 Introduction 58
4.2 Data analysis 58
4.2.1 What are the explicit and implicit rules around reusing digital learning materials? 59
4.2.2 What role does the community play in facilitating reuse? 69
4.2.3 How do roles and responsibilities enable or inhibit reuse? 78
4.2.4 How does technology enable or inhibit reuse? 82
4.3 Aggregate view of the data 86
4.3.1 Text frequency analysis 87
4.4 Identifying tensions in the system 91
4.4.1 What are the explicit and implicit rules around reusing digital learning materials? 91
4.4.2 What role does the community play in facilitating reuse? 93
4.4.3 How do roles and responsibilities enable or inhibit reuse? 94
4.4.4 How does technology enable or inhibit reuse? 94
4.5 Chapter summary 96
5 Summary and recommendations 97
5.1 Summary of research questions 97
5.1.1 What are the implicit rules around reusing digital educational materials? 97
5.1.2 What role does the community play in facilitating reuse? 99
5.1.3 How do roles and responsibilities enable or inhibit reuse? 100
5.1.4 How does technology enable or inhibit reuse? 101
5.1.5 Summary 102
5.2 Limitations of the study 102
5.3 Conclusion 103
5.4 Recommendations for further research 104
References 105

Appendix

1.1 Appendix A: Interview schedule 114
1.2 Appendix B: Sample consent form 116
1.3 Appendix C: Workshop notes 117
1.4 Appendix D: Interview scripts 121
1.5 Appendix E: Email to SHAWCO curriculum developers 182

List of figures

Figure 2.1 Distribution of the population by home language (1996 and 2001) 21
Figure 2.2 Granularity of educational resources 25
Figure 2.3 The curation landscape 28
Figure 2.4 Outcome of one activity becomes a tool for others to use towards a new object 33
Figure 2.5 Leont'ev's theory of activity 34
Figure 2.6 The activity system (Engeström, 1987) 35
Figure 2.7 Activity theory's three mediating relationships 36
Figure 2.8 Activity system in relation to themes addressed in the literature review 37
Figure 3.1 Snowballing process 42
Figure 3.2 Resources for curriculum designers and stakeholders on Vula 44
Figure 3.3 Activity system and research questions 47
Figure 4.1 Summary of broader code occurrences 58
Figure 4.2 Broad coding schema 59
Figure 4.3 Summary of codes around rules 60
Figure 4.4 Summary of codes around community 71
Figure 4.5 File types stored in the curriculum database 72
Figure 4.6 Summary of codes around division of labour 79
Figure 4.7 Summary of codes around technology 83
Figure 4.8 Frequency of coded passages organised by role 86
Figure 4.9 Comparing words from curriculum committee versus project leaders 88
Figure 4.10 Comparing words from curriculum coordinators versus curriculum committee 89
Figure 4.11 Comparing words from curriculum coordinators versus project leaders 90
Figure 4.12 Research questions and theoretical framework 91
Figure 4.13 Tension between rules, subject and tools 92
Figure 4.14 Tension between rules and object 92
Figure 4.15 Tension between subject and the community 93
Figure 4.16 Tension between subject and division of labour 94
Figure 4.17 Tension between tool and community 95
Figure 4.18 Tension between rules, subject and tools 96

List of tables

Table 1.1 Themes, research questions and previous research 12
Table 3.1 Profile of interviewees 42
Table 3.2 Consolidated dataset with coding plan 46
Table 3.3 Themes in relation to research questions 47
Table 3.4 Coding framework 49
Table 3.5 Summary of sub-codes for larger coding groups 50
Table 3.6 Example of coding applications 51
Table 4.1 Frequency of coded passages for rules 60
Table 4.2 Frequency of coded passages for community 70
Table 4.3 Frequency of coded passages for division of labour 78
Table 4.4 Frequency of coded passages in relation to technology 82

1 Introduction

1.1 Overview

The internet and advanced digital technologies have enabled the creation of digital resources which can be copied and shared at little cost. An increasing number of academic institutions around the world have leveraged technology to share the digital materials they use to support their own teaching. Materials can be described and indexed using metadata to ensure they are discoverable according to keywords and learning objectives. Resources such as these that have been shared with the wider academic community have been termed 'open education resources' (OER). Institutions such as the Massachusetts Institute of Technology (MIT), Harvard and the Open University have set up public websites which allow anyone in the world to access a selection of teaching and learning materials from their institutions. However, the extent to which these resources are actually being used outside of the institutions is yet uncertain (Harley, Henke, Lawrence, Miller, Perciali & Nasatir, 2006; Petrides, Nguyen, Jimes & Karaglani, 2008).

The term OER was adopted at the United Nations Educational, Scientific and Cultural Organization's (UNESCO) 2002 Forum on the Impact of Open Courseware for Higher Education in Developing Countries to describe openly licensed and shared educational materials. OER includes teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others (Atkins, Seely Brown & Hammond, 2007). Types of OER include full courses, course materials, modules, textbooks, images, streaming videos, tests, simulations, software, and any other tools, materials, or techniques used to support access to knowledge.

The notion of reusing educational materials in education is not new, but has been substantially enabled by global access to the internet. Global accessibility to the internet affords educators an opportunity to share resources on an unprecedented scale. Much of this change has been inspired by the success of the open source software movement (Baraniuk, 2008; Petrides et al., 2008; Seely Brown & Adler, 2008). The main benefit of reusing code in the open source software realm was an increase in quality and efficiency due to collaboration and shared use (Koper, 2003). If digital educational resources can be shared and reused across different contexts, the primary advantage for educators in reusing materials would appear to be the opportunity to reduce time and costs in developing and delivering instruction (Daniel, 2010). Reusing digital educational resources may also provide an opportunity to expose teachers to new ideas and strategies for their lessons (Conole, 2008).

Digital educational resources that can be shared and reused to support learning in various contexts have been termed "learning objects" (Wiley, 2002). Wiley's official designation for a learning object is "any digital resource that can be reused to support learning" (Wiley, 2002:7). When speaking of digital educational materials in the context of this research, I shall refer to electronic teaching and learning materials which may exist in distributed locations online as well as in personal or community collections of resources stored locally on desktop or laptop computers. By contrast, when I refer to OER, I refer to educational materials which have been designated as open for reuse,

adaptation, and sharing by anyone who accesses them on the internet. The primary difference between OER and digital educational materials in general, is the lack of the use of open licensing systems such as Creative Commons for the latter.

Although the current availability of OER offers a potential source of digital educational resources from which to draw, OER is still quite a new idea and research on the creation and use of OER even newer. This research will therefore focus on how educators perceive the reuse of digital educational materials. Specifically this research will explore how students, in their role as volunteer educators, perceive reusing digital educational materials for community engagement projects.

Researchers have surfaced a number of challenges for educators in reusing educational materials including: issues around the context of materials (Calverley & Shephard, 2003; Bennett, Lockyer & Agostinho, 2004; Hatakka, 2009); the material's alignment with teaching practice (Conole, McAndrew & Dimitriadis, 2010); time required to adapt materials (Elliott & Sweeney, 2008; Petrides, Jimes, Middleton-Detzner & Howell, 2010); and copyright concerns (Calverley & Shephard, 2003; Collis & Strijker, 2004). From these research projects it appears that the opportunities afforded by the internet to facilitate the sharing of resources are not being fully realized due to human rather than technical factors. The specific issues around what actually inspires the reuse of educational materials are still under-researched especially with regard to students and student tutors (Harley et al., 2006; Petrides, et al., 2008).

An area that has not yet been subjected to independent research is how students involved in social outreach initiatives might use OER to support their teaching activities. This research project focuses on the work of a student-organised social outreach group at the University of Cape Town (UCT). The Students' Health and Welfare Centres Organisation (SHAWCO) at UCT is a community of students who share a vision "to improve the quality of life of individuals in developing communities within the Cape metropolitan area[1]". SHAWCO members do extensive work in the community as mentors and educators to unemployed youth as well as to secondary and primary level students (Favish, 2007).

1.2 Focal research question/problem

The purpose of this research is to investigate the perceptions of student educators regarding the reuse of digital educational materials for community engagement projects. The specific question I aimed to address is: What perceptions do student volunteers in the social outreach group SHAWCO hold about the reuse of digital educational materials?

Research sub-questions:

1. What are the implicit rules around reusing digital educational materials?
2. What role does the community play in facilitating reuse?
3. How do roles and responsibilities enable or inhibit reuse?
4. How does technology enable or inhibit reuse?

[1] http://www.shawco.org/page.php?pid=18

1.3 Rationale

In 2007, UCT, SHAWCO and many other members of the UCT community signed the Cape Town Open Education Declaration[2]. Signing the declaration denoted support for open education through the adoption of open education practices, a commitment to widening access to education, and an interest in influencing policy. In aligning with the open education initiative, SHAWCO helps contribute to UCT's mission "to be an outstanding teaching and research university, educating for life and addressing the challenges facing our society" (Favish, 2007:2). Former UCT Deputy Vice Chancellor Martin Hall further emphasised this statement in the 2007 UCT Social Responsiveness Report, stating that the meaning of social responsiveness, as defined by the UCT Senate, was: "the production and dissemination of knowledge for public benefit" (Favish, 2007). SHAWCO has aligned itself quite clearly with the UCT mission by providing free educational programmes to the community.

Students in SHAWCO are transient members of the organisation as they progress in their academic careers towards graduation. New members are added each year as first-year students join the organisation, while graduating members depart. While this is natural for a student organisation, it does have implications for how the organisations' educational materials are managed and curated as each year goes by. There is an opportunity for active reuse of digital educational content from both within and outside the organization.

Having been a part of the UCT OpenContent project team and having worked primarily with academics to support their accessing, creation and sharing of online educational materials, I want to understand what perceptions SHAWCO members hold about reusing digital educational materials. This is of interest to educational technology practitioners as it may help facilitate the effective sharing and reuse of materials in resource constrained environments. In exploring the perceptions of materials reuse within SHAWCO, I hope that this research can contribute to the available literature which details how best to support groups of educators in reusing digital teaching and learning artefacts.

1.4 Theoretical framework

Theoretically this research examines the perceptions of members within SHAWCO using the lens of an activity system (Engeström, 1987). When examining the use of computers within social settings, in this case to facilitate the reuse of educational materials, an activity system enables the researcher to look beyond the technology by placing it within the broader scope of human activities (Kaptelinin & Nardi, 2006).

The activity system model takes into account the broader social context experienced by individual student volunteers acting collectively towards a shared object of improving the quality of life of individuals in developing communities through education. Individual volunteers are subject to rules, interact with the community and take on certain roles (resulting in the division of labour) when engaging in their teaching activity.

[2] http://www.capetowndeclaration.org

Activity theory uses the notion of contradictions to represent structural tensions between the elements of the activity system (Engeström, 2001). For instance, a change in the tools used towards some intended object of activity may result in new roles for those participating and new rules for how the activity plays out. In the case of SHAWCO I will explore: how new tools are being appropriated into the system of activity; how implicit or explicit institutional or organizational rules impact on this activity; how the community supports this activity; and how roles and responsibilities shape this activity.

This research specifically examines the perceptions that student volunteers in SHAWCO hold about the reuse of digital educational materials. The research questions specifically aim to investigate how the rules, community, and division of labour impact upon students' perceptions and practice; and whether any misalignment in the current system can be identified.

1.5 Introduction to the research design

This research has adopted a case study methodology using the students volunteering in SHAWCO at the beginning of the 2011 academic year. The students, technology landscape and social conditions in South Africa can be thought of as a "bounded system" (Stake, 1994). Using the bounded system approach allows us to unpack the "complex dynamic and unfolding interactions of events, human relations, and other factors in a unique instance" (Cohen, Manion & Morrison, 2007).

The research has focused on primary data obtained from SHAWCO members through a series of semi-structured interviews following the interview schedule displayed below. In total, six interviews were conducted with volunteers of various roles within SHAWCO. Table 1.1 displays the themes which emerged from the activity theory element, the detailed research sub-questions and links to previous research addressing these themes.

Table 1.1 Themes, research questions and previous research

AT Concept	Research question	Research theme
Rules	How do you feel about reusing materials which have been created by others (or online) into your teaching/curriculum?	Reuse/Adaptation
	How do you go about finding or developing suitable teaching materials?	Reuse/Adaptation
	Do reused materials most often get used as is, modified, or mixed with other materials?	Reuse/Adaptation
	If you have modified the materials in any way, how do you make this modified version available to others? (The redistribution issue)	Teachers' autonomy
	How much flexibility do teachers in the field able to deviate from the set curriculum during a lesson or create their own lessons?	Teachers' autonomy
Community	What is considered an authoritative source of teaching material for reuse? (Commercial texts, online resources, print material, government curriculum)	Authoritative materials

	How important is the context of a piece of learning material to your decision to use it?	Context
	How concerned are you about copyright when sourcing educational materials?	Copyright
	How satisfied are you with Vula (UCT's learning management system) as the central place where SHAWCO materials are stored for reuse?	Curation
	Do you find Vula also captures well documented learning activities as well as content?	Curation

Division of labour	How do you share teaching practice within SHAWCO and the projects? (successes stories, excellent activities)	Teaching practice
	How would you feel about reusing resources from other social organisations such as TeachOut or Ubunye? Why or why not?	Not invented here syndrome
	Who else is involved in assembling and compiling your teaching materials? (Other SHAWCO volunteers, lecturers, school teachers?)	Teaching practice

Tool use	Which technologies do you use most for finding and sharing resources (e.g. Vula, Email, IM, Gdocs, websites)? How has this experience been?	Technology facilitating reuse
	To what extent does technology enable or hinder your ability to share your teaching practice and resources with others in SHAWCO?	Technology affordance

Interview scripts were transcribed from the audio recording and sent back to the interviewees for comment before being coded. They were then carefully analysed using primarily inductive reasoning with the goal of abstracting a 'generalization' (Cohen et al., 2007:6) of the situation in SHAWCO. Responses were coded according to the themes identified. The qualitative analysis process attempted to draw out common perceptions according to the themes.

This research study involves human subjects, specifically students studying at UCT who are voluntary members of SHAWCO. Having reviewed the Humanities Ethics Guide and specifically the UCT Code for Research Involving Human Subjects, all considerations outlined in the guide have been adhered to. The research proposal was given approval by the Research Ethics Committee's (REC) prior to the commencement of the interviews.

1.6 Thesis structure

Chapter 1 provides an overview of the research, background to the study, the rationale, the research questions, the theoretical framework and research design.

Chapter 2 reviews the available literature on the reuse of digital educational resources by teachers in various contexts. This chapter also examines and critiques the conceptual and theoretical underpinnings with which other researchers have examined this phenomenon. I also provide a detailed account of the theoretical framework underpinning this study. I explain the rationale

behind the selection of activity theory as an analytical framework in the research, and provide a description of the taxonomy of themes and how they align with those identified in the literature.

In **Chapter 3** I unpack the research design and methodology used in the study. The discussion includes the selection of research subjects, choice of methods, instruments and their relation to the theoretical framework and the data analysis. This chapter also contains a thorough reflection on validity and ethics considered throughout the study.

Chapter 4 elaborates upon the data analysis of the research and presents a thorough discussion of how the theoretical framework was applied to data collected in the study.

Chapter 5 provides a summary of the research findings, reflections on the research, and implications for future research.

2 Literature Review

2.1 Introduction

In this chapter I review the literature on the use of digital resources in education and recent developments in the OER movement. I also explore the factors that have been documented which impact upon how materials are reused by educators. I then review the current state of schooling in South Africa, and investigate how social outreach groups have aimed to alleviate some of the challenges schools are facing. Empirical studies that explore the challenges educators face in reusing materials will be reviewed. The methodological and theoretical perspectives adopted to understand these processes are explored. Specific works which inform the remainder of this research are identified in the final section of the chapter.

2.2 Exploration of Concepts

2.2.1 The origins of reusable learning objects and the development of OER

There is a growing global demand for access to education. This has placed a tremendous burden on education sectors around the world. Simultaneously, information and communication technologies have made us the most globally connected society in history. The internet not only enables the sharing of resources, thereby increasing access to information, but also enables anyone to quite easily create content and share it online, blurring the line between producers and consumers (Seely Brown & Adler, 2008). While we are beginning to see global access to some of the world's knowledge through websites such as Wikipedia, there is still a need for educators to engage in activities which help students make sense of information.

Learning activities, lesson plans, textbooks, presentations, simulations and other educational materials are typically used in learning activities to help mediate a student's understanding of concepts. The internet provides a space where we can store, share, tag, describe, search and locate these resources in electronic form. Since the year 2000, many of these digital educational materials have evolved from what were originally called "information or learning objects" to be known as "open educational resources".

Hodgins (2000) termed information objects, in the context of education, as "the smallest useful piece of information that can be used and re-used, such as an illustration, a question, a definition, a procedure, or a sound" (Hodgins, 2000:46). Information objects could represent some idea or knowledge in a readily sharable, reusable, small chunk of content. Hodgins' vision was that these "knowledge building blocks" could be reused and combined to create a vast array of learning experiences tailored exactly to the learning context (ibid.). Much of Hodgins' work was a vision of things to come; however it did not fully take into account the implications of educators reusing and combining educational materials created by others within different contexts.

The concept of "information objects" evolved into "learning objects" and the term was popularised by David Wiley in 2002. Wiley (2002:7) defined a learning object as "any digital resource that can be reused to support learning".

By its nature a digital resource can easily be copied, shared and reused. A learning object can be as small as an image or diagram and as large as an entire course syllabus. Due to the object-oriented nature of learning objects, it has been proposed that a learning resource created for a particular context and pedagogical need might be useful in another context (Wiley, 2002). As learning objects are, by their very nature, digital resources, they can be copied and distributed to many for use simultaneously, unlike physical educational resources (ibid.).

Learning objects may be appropriated by self-learners; used in the classroom, perhaps to create assignments or assessments; or mixed and combined to create resources driven by pedagogical needs (Metros & Bennett, 2002). Many institutions, in the later part of the 20th century, began to look at ways of archiving and sharing learning materials within their institutions. With an institutional repository of learning objects in place, it was proposed that educators could focus more on the processes of supporting learning and not on the production of content to support their teaching (Duncan, 2003).

The development of institutional repositories led to the need for standards to describe learning objects. Standards were required to enable people to efficiently search for materials, as well as to share materials between institutions. These sets of standards, called 'metadata', typically provide a description of the content and its recommended pedagogical application. The Institute of Electrical and Electronics Engineers (IEEE) Standard for Learning Object Metadata (LOM) is an internationally recognised set of open standards for describing learning objects, which was created in conjunction with the IMS Global Learning Consortium and the ARIADNE Foundation (Olivier & Liber, 2003). Other metadata models include the SCORM project[3] and Dublin Core[4].

2.2.2 The emergence of Creative Commons licensing

As more and more learning content becomes available via the internet, the issue of intellectual property and copyright becomes an increasing concern. Creative Commons[5] emerged in 2001, providing an alternative legal framework for specifying conditions for reuse of creative materials. Creative Commons provided the vehicle for content creators to specify a licence for reuse of their content with "some rights reserved", thus providing an alternative to the "all rights reserved" model of traditional copyright (Atkins et al., 2007). The first set of Creative Commons open licences launched in 2002 with the aim of enabling an economy of sharing via the internet (Batson, Paharia & Vijay Kumar, 2008). The ambiguity of traditional copyright in the digital world had been eased with a simple form of licensing which, by default, gives any content creator attribution, while allowing others to make use of the material in their own context. Creative Commons is therefore not an alternative to copyright, but an alternative copyright management tool for people interested in sharing their creative works.

2.2.3 Open Educational Resources

The term open educational resources (OER) emerged as a result of many years of digital educational content production, advances in information and communications technology (ICT) and a

[3] http://scorm.com/
[4] http://dublincore.org/
[5] http://creativecommons.org/about/history

commitment on the part of educational institutions around the world to ensuring access to education for all. In 2002 the term "open educational resources" was proposed at the UNESCO Forum on the Impact of Open Courseware for Higher Education in Developing Countries (UNESCO, 2002). Creative Commons licences finally gave the creators of learning objects a tool which they could apply to their works, allowing others to legally reuse their material. Learning objects could now carry clear and easy to understand rules for how they could be reused by other educators. At the time, the definition proposed for OER by UNESCO was:

> *The open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes.* (UNESCO, 2002:24)

This definition was further refined by Atkins et al. (2007):

> *OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge.* (Atkins et al., 2007:4)

The Massachusetts Institute of Technology (MIT) was the first university to formally release a selection of its own teaching materials to the public via the internet. Since then, many leading institutions have followed suit, including the University of Cape Town in 2010[6]. Some institutions have released their entire course materials, and some have offered a selection of educational materials. Academic institutions are now contributing scholarly resources to the global knowledge commons made possible by the internet and Web 2.0 tools. The OpenCourseWare Consortium (OCWC), originally started in the United States, has had significant impact on the movement. The consortium currently has 186 member institutions of higher learning from 45 different counties around the world[7].

Open institutional repositories of OER are now available from leading instructions around the world. Institutions such as Johns Hopkins[8] specialise in resources for public health, whilst others contain a range of objects in a variety of disciplines[9]. In addition to institutional repositories, content-specific repositories have emerged for specialised media. Websites in this category include the Creative Commons collections on Flickr[10] for images; Curricki[11] for lesson plans; Flat World Knowledge[12] for textbooks; Academic Earth[13] for video; and the World Lecture Project[14] for audio. These open repositories of OER give educators a means of sourcing content or inspiration for their own lessons.

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[6] http://opencontent.uct.ac.za
[7] http://www.ocwconsortium.org/members
[8] http://ocw.jhsph.edu/
[9] http://oli.web.cmu.edu/openlearning/forstudents/freecourses
[10] http://www.flickr.com/creativecommons/
[11] http://www.curriki.org/
[12] http://www.flatworldknowledge.com/
[13] http://academicearth.org/

2.2.4 A new resource for educators

Not only has the web dynamically evolved since learning objects were first envisioned by Hodgins (2000) and Wiley (2002), but the systems to support the discovery, integration, and application of resources into educational scenarios have also improved. Cumbersome and isolated learning-object repositories have been replaced by a web of educational resources, often traceable to their original authors. Whereas in the early part of the 21st century educators may have considered it taboo to "trust" the internet, they are now able to source academic content on the internet from reputable institutions.

In addition to institutional repositories, global portals for searching and accessing resources have also emerged. Websites such as OER Commons[15] and the OCW consortium[16] use the metadata made available by the institutional and media-specific repositories to aggregate OER content from across the internet. This allows educators trying to discover content to search via a single portal and gain access to resources from a range of institutions and other content-sharing sites.

An important aspect of OER is that it should ideally be easily integrated into a learning scenario. Granularity refers to the size of the object, be it an entire document or an image within that document (Duncan, 2003; Atkins et al., 2007). Creative Commons has aided educators' understanding of what they may be able to use within a resource by providing a blanket license on resources. However, certain digital formats are much more conducive to reuse than others. For example, the use of the Portable Document Format (PDF) is said to limit the reuse of materials, especially a portion or component of a given document, whereas a format such as a Microsoft Word document may be easier to copy materials for reuse (Atkins et al., 2007).

With the growing body of open educational material available online, there has been a switch of focus from "how can we grow and sustain the body of available content?" (Atkins et al., 2007; Downes, 2007) to "how is this content getting used, and is it actually useful to educators?" (Hatakka, 2009; Conole et al., 2010; Petrides et al., 2010).

2.2.5 Reusing educational materials in a digital world

There have been a number of calls for research into the experiences of educators in reusing digital educational materials (Bennett et al., 2004; Duncan, 2009; Harley, 2008; McGill, Currier, Duncan & Douglas, 2008). Reusing educational materials is not a new idea, as textbooks, lecture notes and other resources have been used and reused in the process of educating for many centuries now. What is quite new are the advancing information and technology systems which enable the sharing of educational materials within communities via the internet. Educators and students are now afforded the opportunity to explore very specific educational resources online in addition to the more traditional method of exploration in a local bookstore or library.

The wealth of teaching and learning materials now available online for legal download and use provide teachers with an opportunity to select and combine resources without re-inventing the wheel every time they construct their curriculum. An added advantage is the possibility that

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[14] http://www.world-lecture-project.org
[15] http://www.oercommons.org/
[16] http://www.ocwconsortium.org/courses/search

learning may be supported using materials freely available under open licenses, with less reliance on expensive proprietary textbooks. In addition, it has been suggested that reusing materials and their associated learning designs may lead to the proliferation of good practice amongst teachers (Littlejohn, Jung & Broumley, 2003; Philip & Cameron, 2008).

A number of researchers have attempted to define the concept of reuse. Koper, Pannekeet, Hendriks & Hummel (2004:2) defined reuse as "the integration of a learning object created by someone else in the context of a new course". Masterman and Lee (2005:40) defined reuse as "reusing or adapting material created by someone else (i.e. not simply reusing your own material)". Petrides et al. (2008:109) defined reuse as "remixing or adaptation of OER for new and/or local purposes". While Koper (2003) did not specifically mention adaptation, in his definition he does recognise the need for remixing and adaptation of materials in the process of reuse.

Wiley (2008) articulated a useful framework for defining the more specific activities around OER reuse:

- Reuse – Use the work verbatim, just exactly as you found it.
- Revise – Alter or transform the work so that it better meets your needs.
- Remix – Combine the (verbatim or altered) work with other works to better meet your needs.
- Redistribute – Share the verbatim work, the reworked work, or the remixed work with others.

In the context of this study, reuse is defined as the selection and integration of digital educational materials into teaching activity. Following Wiley (2008), materials may be used as is; used with revision, remixed with other materials; and/or redistributed after adaptation. Materials are most likely to be revised or remixed when there is a need to localise or adapt the material to suit the context of the educational setting.

2.2.6 Schooling in South Africa

Section 29 of the Constitution of the Republic of South Africa states that everyone has the right to access basic education[17]. Basic education includes the child's "reception year" otherwise known as "R", through to grade 12 or "matric" – the year of matriculation[18]. In 2002 the Revised National Curriculum document for grades R–9 defined the primary learning areas for students as languages, mathematics, natural sciences, technology, social sciences, arts and culture, life orientation and economic/management science.

Meaningful access to education exists when schools enable learners to read, write, work with numbers, shape and pattern, and apply concepts in order to understand the world around them (Pendlebury, Lake & Smith, 2009). While physical access to educational institutions in South Africa is quite good, the conditions and resources available within institutions vary throughout the country (ibid.). Unfortunately, the conditions that many students experience are cast before them based on the history of South Africa, as Pendlebury et al. (2009:25) note:

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[17] http://www.info.gov.za/documents/constitution/1996/96cons2.htm#29
18 http://www.education.gov.za/EducationinSA/tabid/327/Default.aspx

Meaningful access to basic education depend(s) largely on who has access to what kind of schooling and on what basis. Poverty, race, gender, geography and disability may all affect school attendance and the quality of schools that children attend.

The South Africa schooling system has made many gains in balancing the quality of education in terms of reducing the level of overcrowding and increasing access to electricity, water and sanitation in schools (Department of Education, 2007). However, there are still many schools that lack basic infrastructure – a situation which provides less than favourable conditions for learning.

The 2008/2009 South African Child Gauge (Pendlebury et al., 2009) and a study by Howie and Scherman (2008) suggest a number of factors which may further influence the quality of education. Among the factors which are most relevant to this study are the levels of access to textbooks and other learning materials within schools and teacher and learner multilingualism.

Access to physical teaching resources in some South African schools is significantly limited. Teachers are at times required to photocopy the few resources which are available or laboriously copy the materials on to a chalkboard (Pendlebury et al., 2009). Furthermore, only roughly 7% of schools were found to have library spaces that are adequately stocked with resources (Department of Education, 2007; OECD, 2008). The shortages in actual teaching materials within schools present real challenges for school teachers trying to teach or for students endeavouring to learn independently by exploring books in a library. These resource constraints pose significant challenges for educators who have to make do with limited resources.

The Constitution of the Republic of South Africa[19] recognises 11 official languages spoken within the country. In order of the most frequently spoken language in the home, these languages include IsiZulu, IsiXhosa, Afrikaans, Sepedi, Setswana, English, Sesotho, Xitsonga, SiSwati, Tshivenda and IsiNdebele. Figure 2.1 shows the percentage of first language speakers for each of the county's official languages (Statistics South Africa, 2001).

[19] http://www.info.gov.za/documents/constitution/1996/96cons1.htm

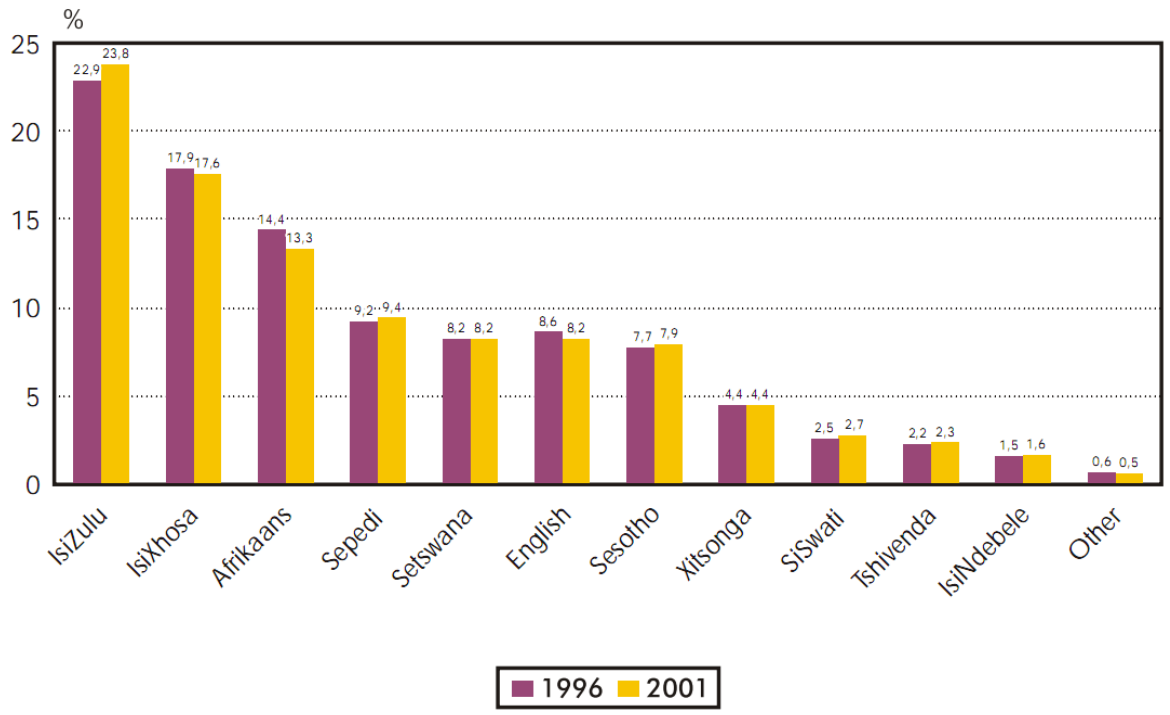

Figure 2.1 Distribution of the population by home language (1996 and 2001)

Figure 2.1 illustrates the sizable group of learners who will encounter English as a second language in the school system. In addition, Howie and Scherman (2008) report that in the most disadvantaged classrooms in the country teachers are often instructing in a second language. This raises issues around not only the students' understanding, but also the ability of the teacher to communicate the lesson accurately in a second language.

Vast inequalities still exist within South African schools in terms of school conditions, teacher characteristics, and the availability of resources (Pendlebury et al., 2009). Although the South African Department of Education has made strides towards improving the situation, there is still a need for community outreach programmes such as SHAWCO to enhance the experience of students preparing for higher education. Social outreach programmes can help by providing leadership and role models for learners; bringing additional learning materials into the community; and providing a little extra help to multilingual learners struggling to understand school curriculum.

2.2.7 The nature of social outreach groups

Critical to the growth and well-being of South African society is the role of universities (Department of Education, 1997; Taylor, Erwin & Bytheway, 2005; Badat, 2009). Universities by their nature are responsible for the production and dissemination of knowledge. While in recent years many universities have begun to seem more like commercial entities, there is a strong argument for them to retain the original principles of serving society at large, especially in an age of knowledge enhanced by ICT (Duderstadt, 1997). One way of balancing this is through the university's engagement with the community.

Students at university are in a privileged position of having access to resources and services many in the community go without. Given the right opportunities, students may voluntarily engage in

community service learning through social outreach, thereby increasing access to knowledge in the community. Research has indicated that some students view voluntary community work as a stepping stone to a good career by providing valuable work experience (Mueller, Thornton & Wyatt, 2005).

Jacoby (1996:5) defined community service learning as "a form of experiential learning in which students engage in activities that address human and community needs together with structured opportunities intentionally designed to promote student learning and development". Many students are willing to give up significant leisure time to participate in social outreach. Students report that social outreach work provides them with employment experience, connections to the community (Mueller et al., 2005) and altruistic satisfaction at having made a difference in the community (Green & Anderson, 2006).

A distinction must be made between community service learning which takes place as part of a credit-bearing course, and that which is completely voluntary. The former is usually part of a set curriculum and is managed by lecturers and the university, whereas the latter is purely voluntary and managed by students. Students at UCT who engage with SHAWCO's education programme do so voluntarily.

SHAWCO's education programme consists of 11 student-run projects in Khayelitsha, Manenberg, Nyanga and Kensington. These areas make up a large part of the impoverished township areas in the Cape Town metropole, and were established as the result of pre-1994 apartheid government's policies. Not all of these centres have access to advanced computing facilities for accessing and using digital resources online. The current study has therefore focused on how materials are shared and reused by SHAWCO, and not on the specific tools used in the education programmes on location.

The principles of open education and social outreach are quite similar; both promote access to education and wider community engagement. One might envisage that the objective of the OER movement would be to provide resources which social outreach groups such as SHAWCO could use to enhance their programme. However, there is a dearth of research on how social outreach groups are benefiting from the OER movement.

2.3 Challenges to the reuse of digital educational materials

2.3.1 Introducing the challenges to materials use

Despite the wealth of educational content now available online under open licences ready for reuse, educators still face challenges in making use of these materials (Calverley & Shephard, 2003; Browne, Holding, Howell & Rodway-Dyer, 2010). The purpose of this research is to explore some of the challenges student educators face in selecting, adapting and using digital educational resources for social outreach. Some of the key themes which have emerged in the literature are: the appropriate context of materials; the time and care required for adaptation; issues around copyright; indexing and storage of resources (curation); the need to share teaching practices; ownership ('not invented here'); educators' autonomy; educators' availability; how technology facilitates sharing; and technological affordances. The following section will explore these themes in greater detail.

With the wealth of resources openly available online and within educational repositories, educators should be able to quickly select the best possible materials for use in supporting their teaching. There is a growing need to understand how the internet might be used as a resource for identifying educational materials for reuse. The emerging body of OER literature has raised key issues such as how educators determine what are considered authoritative materials for reuse (Bennett et al., 2004; Petrides et al., 2010) and how they asses resource value and relevancy (Calverley & Shephard, 2003) for a learning task.

The quality and relevance of an educational resource will vary according to specific purpose. Educators make decisions about what is fit for purpose when they are preparing their lessons and organising content. The following section attempts to unpack some of the issues that are raised when educators scrutinise resources for use.

2.3.2 Resource context

Context refers to how suitable or 'fit-for-purpose' teaching resources match the needs of a situation (Calverley & Shephard, 2003). Materials suitable within one learning context may be unusable in another ostensibly similar context. Previous studies have addressed issues such as how important educators consider the context embedded with a resource and how this may factor into their decision to reuse materials (Harley et al., 2006), and how educators decide if the educational materials appropriately fit the context of the learning environment (Bennett et al., 2004).

In Hatakka's (2009) study of open educational resource use in developing countries, context emerged as one of the greatest barriers to materials reuse. This is due to the variations in how educators interpret quality, variations in language, the challenge of bringing resources from developed countries into developing contexts or for use within other cultures, inappropriate pedagogical strategies, or the level of content which may not be appropriate in the new context (Hatakka, 2009). As Albright aptly notes:

> "OER are cultural as much as educational, in that they give users an insight into culture-specific methods and approaches to teaching and learning." (Albright, 2005:12)

Teaching practices differ around the world and certain practices may not work in other contexts. OER does enable educators to explore teaching practices and resources so that they may be able to discover new ways of teaching. However, resources which are culturally embedded in a specific context may be more challenging to actually reuse in vastly different contexts (Conole et al., 2010).

2.3.3 Ease of adaptation

An important consideration that needs to be taken into account when deciding to reuse a resource, is how easy or difficult it is to adapt the resource in order to localise the material for the appropriate audience. Koper (2003) found parallels to the object-oriented software design process and suggests the following three conditions for optimal adaptation of digital educational materials:

(i) The materials are abstracted towards pedagogy, context, and media

Koper (2003:51) suggests that learning materials be created "pedagogically neutral", allowing them to support many pedagogical approaches from knowledge transmission to collaborative work. He

maintains that teachers reusing materials which are abstracted from pedagogy can employ a range of learning strategies suitable for the context, personalised where necessary.

However, resources designed within certain contexts often include the limitations and opportunities specific to the context that are embedded within the resource. Koper (2003) recognises the challenge for material designers in abstracting context when resources are developed within and for a specific context in the first instance. Equally, Conole et al. (2010) argue that digital learning resources have an implicit design embedded within the materials by the designer. Conole et al. (2010) go on to suggest that making these designs explicit may be more worthwhile than attempting to abstract pedagogy and context from resources. In terms of the OER movement, they suggest that content creators "move from making content available to helping people understand how to make good use of that content" (Conole et al., 2010:19).

Abstraction from media would mean that an educational resource could be accessed and used in many formats. This may be achieved by using open standards such as the Extensible Markup Language (XML) which can be read, edited and accessed on many different software platforms. Ideally, resources should be easy to use in a variety of electronic forms so that they can be edited, mixed and combined with other resources.

Furthermore, materials which require the presence and support of various technologies can be more difficult to use in resources constrained contexts. For instance, activities may require access to books, computers, specific software or the internet, which may not always be available. These factors can inhibit the potential adaptation of a resource depending on the available supporting technologies.

(ii) The materials are small enough to be aggregated into larger meaningful units

Granularity refers to the size of a learning object (Duncan, 2003). Granularity is hierarchical in most cases. For example, a textbook can be used as a single resource, but even a single chapter in that book, a section of a chapter or an individual image within the chapter could be a useful learning object. The most reusable materials will be those which can be easily extracted at any level for reuse. Figure 2.2 shows a potential hierarchy of educational materials in relation to a course.

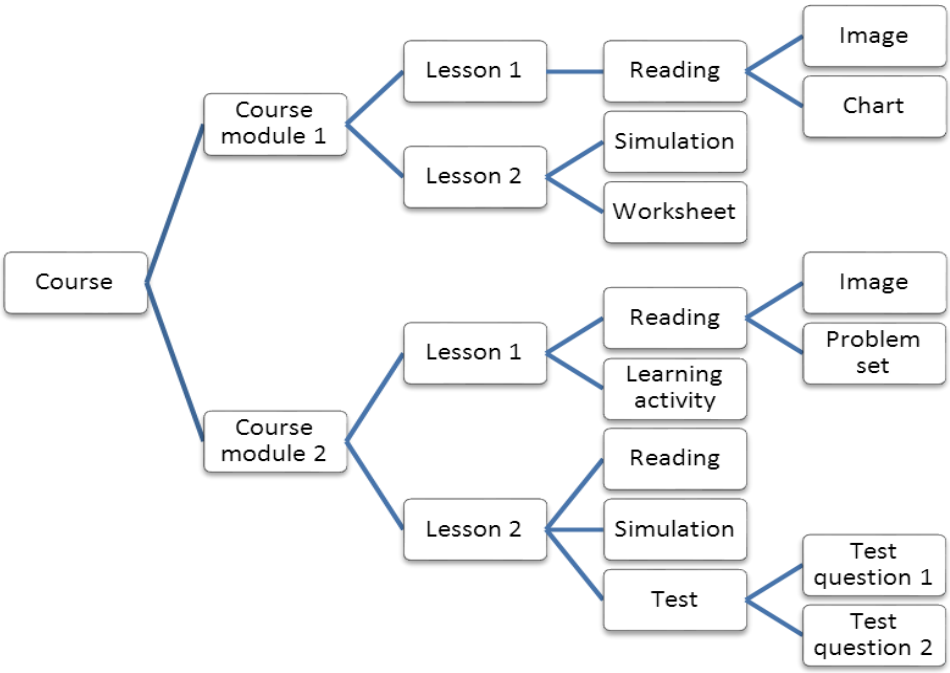

Figure 2.2 Granularity of educational resources

As Figure 2.2 illustrates, educational materials may be widely diverse and range in scope from entire courses to individual learning materials. Resources which are most easily reused should be easily extracted at any level for educators to integrate into their own curriculum.

(iii) The objects stand on their own

Koper (2003) suggests that the educational materials which will be most useful are those which encapsulate the content and logic needed to understand them in isolation. An image which has been used from a textbook can therefore function independently if it provides the educator with all of the necessary supporting documentation required to understand it.

Furthermore, Conole et al. (2010) recommend that the ways in which a resource may be used or adapted by educators be articulated in the learning design document. This support document helps the teacher to apply it, thus allowing the resource to stand on its own and become more useful. This argument is drawn from the logic that resources in isolation may be difficult to use, as each resource has an intrinsic design embedded by the designer.

2.3.4 Issues of copyright

According to South African law, the authors of creative materials automatically retain full copyright over their works without having to declare or assert this right (Schonwetter, Ncube & Chetty, 2009). When these materials are placed online without explicit terms for reuse, the materials remain under copyright. While the internet has given individuals new and easy ways to share culture and ideas, the downside is that these now fall within the regulation of the law (Lessig, 2004). In his 2004 novel *Free Culture*, Lessig states:

> *For the Internet has unleashed an extraordinary possibility for many to participate in the process of building and cultivating a culture that reaches far beyond local boundaries. That*

power has changed the marketplace for making and cultivating culture generally, and that change in turn threatens established content industries. (Lessig, 2004:9)

A growing body of educational content is being created by individuals whose intention it is for those materials to get reused globally. The mass of educational content now shared freely online as a result of the OER movement provides educators with alternatives to using more costly sources of content.

Previous research suggests that the ambiguity of the copyright conditions on many of the digital resources found online can make it difficult for educators to know if they are able to legally reuse materials (Calverley & Shephard, 2003; Harley et al., 2006). Online materials most often do not come with explicitly clear terms for reuse. Additionally, due to the "anarchic" nature of the internet, materials can be easily copied, mixed or shared, making it difficult to determine the source or accuracy of the material (Calverley & Shephard, 2003). It has been noted that some educators have difficulty interpreting copyright and simply ignore it outright due to pressure and convenience (Harley et al., 2006).

Educators attempting to source materials for reuse in their classroom are most likely to claim that this activity falls under the "fair dealing" provision contained in Section 12 of the Republic of South Africa Copyright Act[20] (Schonwetter et al., 2009). It is worthwhile noting that the "fair dealing" clause in the South African legislation is much less comprehensive and specific then the "fair use" clause in the US Copyright Act[21]. Unfortunately, the specific educational use cases around fair dealing in South Africa are quite ambiguous and present a myriad of challenges for educators sourcing content in a digital world (Schonwetter et al., 2009).

Creative Commons licences are increasingly becoming a familiar option for people looking for content to reuse online. Creative Commons licenses allow content creators to more explicitly state the conditions under which other people may use their work. Works licensed under Creative Commons are therefore easier to reuse, build upon or adapt. Many of the online OER repositories now license content under Creative Commons, which provides clear guidelines for reuse.

2.3.5 Resource curation

In order to effectively organise and share digital educational materials, institutions require a system or repository which will enable them to be found by educators in the community. Resources may be found on users' hard-drives; in a password-protected learning management system (LMS); or more favourably in an institutional repository. Repositories have the advantage of making good use of metadata to describe the resources they host. "Being without metadata is akin to trying to find a house when someone's taken away all the street signs, or to prepare a meal from cans that have no labels" (Hodgins, 2000:28).

In an optimised reuse environment it is important to ensure that resources are not only taken out, but also put back into the repository when improvements have been made. This has to do with how

[20] http://www.cipc.co.za/Copyright_files/Copyright_Act.pdf
[21] http://www.copyright.gov/title17/

versions of materials are controlled and updated over time. Unfortunately, not all educators have access to a well designed repository of teaching materials which could facilitate the curation of teaching materials. Institutions are more likely to actively curate books and journals with great priority, while teaching resources are seemingly undervalued (Calverley & Shephard, 2003).

While materials can be easily shared via email or through a central repository, the actual format of those resources can enable or hinder their reuse. Consider an educational resource created with proprietary software which requires that specific software in each instance the resource is used. Certain file formats are also less conducive to reuse and remix. The popular PDF is locked from editing and can be difficult to copy text for use in other formats. The broader issues around formats and standards for sharing materials therefore factor heavily on the actual resource's suitability for reuse. Certain institutions have made very explicit stipulations around format, and either make materials available in a variety of accessible formats as has the Open University, or in a very simple and standardised form such as XML as has Rice University.

Institutions such as MIT have provided their own staff with an institutional repository for curating and sharing educational media as OER. This can be labelled the 'institutional repository approach' to curation. Other institutions have gone for a more broad approach to curation, allowing edits and contributions from authors all around the world. Rice University's Connexions[22] project allows anyone to create new or remix existing content on their site. Likewise, the Open University's Labspace[23] allows users to create content on request[24] and allows modifications of existing web content. Connexions and Labspace can be labelled as 'institutional remixing platforms' for the curation of materials. California State University's Merlot[25] project provides anyone in the world a hosting option for their OER, thus providing a 'global repository'. The 'referatory model' for curation hosts metadata about resources regardless of where they are hosted. At UCT, the OpenContent[26] directory directs people to links on the internet or UCT server where resources are hosted, but does not host the actual resources. OER Commons[27] employs a similar model albeit on a more global scale, as their site refers to locations from a number of institutions all over the internet where materials are hosted. This can be referred to as a 'global referatory'. See Figure 2.3 for a summary of the curation landscape.

[22] http://cnx.org
[23] http://labspace.open.ac.uk
[24] http://labspace.open.ac.uk/mod/resource/view.php?id=427373&direct=1
[25] http://www.merlot.org
[26] http://opencontent.uct.ac.za/
[27] http://www.oercommons.org/

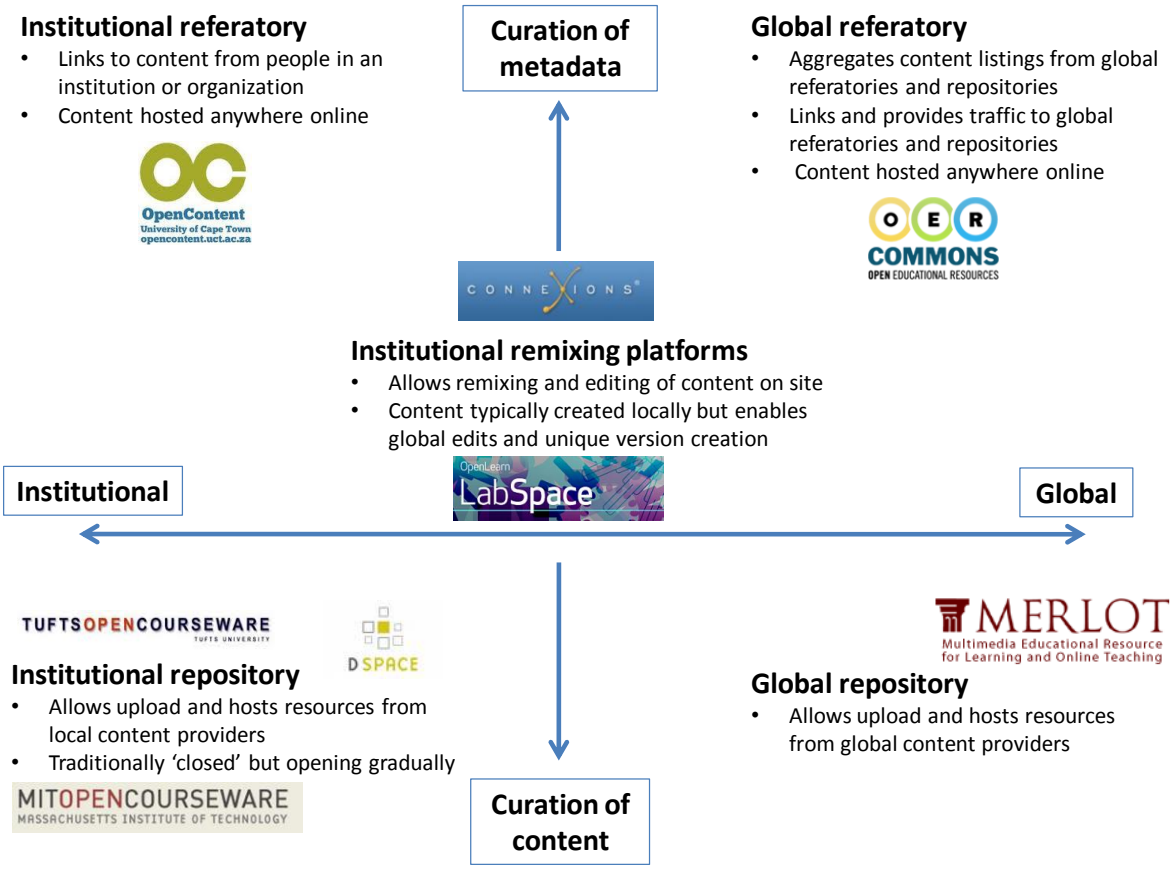

Figure 2.3 The curation landscape

Conole et al. (2010) suggest that curating the learning designs on which resources have been based is of utmost importance. In addition to describing the educational materials with descriptive metadata, Conole et al. (2010) suggest that the original author also communicates particular approaches for using the materials. A number of the existing OER repositories have attempted to capture this information about how materials can be reused within the resource's metadata. However, the articulation of learning design has to be quite thoughtfully documented to be useful to future users.

2.3.6 Need for well documented teaching practices

In their research, Conole et al. (2010) highlight the need for a system of sharing the activities and processes which make use of the educational materials. Conole et al. (2010) put forth the idea that every learning object has an inherent design or intended use pattern and by making that design more explicit we may foster reuse. The challenge for educators who encounter resources created by others is designing and implementing a pedagogically sound activity in which the resource can be used in practice. Conole et al. (2010) argue that we need systems to share how learning activity designs can be reused, as opposed to just sharing the content. Sharing of learning designs means the explicit definition of the context in which the resource may be used, the recommended pedagogical strategy, and the types of tasks a student will undertake as part of the activity (Conole, 2008). Sharing all of the supporting 'mediating artefacts' which are associated with educational resources may result in the proliferation of good teaching practices.

A number of authors have pointed to the role of online communities in facilitating the selecting, reusing, sharing and curating of practices for use by likeminded practitioners (Calverley & Shephard, 2003; Harris & Higgison, 2003; Koper, 2003). Resources shared within online communities can help to serve the shared teaching practices of the group if they have also explicitly documented the actual learning designs in line with Conole's (2008) discussion.

2.3.7 Pride of authorship

Often cited as a barrier to materials reuse is a phenomenon termed the "not invented here" syndrome; which is the reluctance of educators to use teaching materials that have been created by others. Bryant (1998) argues that this is often a matter of the necessary time required to assess and modify resources rather than a negative attitude to using other's work. Hatakka (2009) reports that educators have a sense of pride and ownership associated with creating teaching materials and feel it is their responsibility to design their own content from scratch. Educators have generally acknowledged that they are all 'borrowing' from content and ideas around them, even if in a non-attributable way (Browne et al., 2010). Perhaps Wiley's (2008) proposition of reuse through revision and remix may allow educators to feel that they have had a chance to put their own spin on materials being reused.

2.3.8 Educators' autonomy

The degree of flexibility educators have in customising their curriculum can impact upon their ability to select materials for reuse (Petrides et al., 2010). Teachers' autonomy to choose which resources they desire to use can be hindered by administrators or national curriculum goals which dictate specifically what they have to do in the classroom (Hatakka, 2009). This relates to how institutional rules impact upon a teacher's practice.

The degree of flexibility from which a teacher can deviate from a set curriculum will vary widely by context. In some contexts curriculum may be designed by educators who are not doing the actual teaching, whereas in others the teachers alone determine what materials and content are used. The rules around this issue of educators' autonomy will be explored further in the context of this study.

2.3.9 Educators' availability

Educators may have difficulty allocating time to deliberately select materials outside of the core curriculum. Locating and assessing educational materials created within different contexts can be a lengthy process depending on the institutional resources and educators' awareness of where they may source material. Browne et al. (2010) note that some educators don't necessarily see reusing materials as a time-saving practice and perhaps see this process as adding to their workload. This may lead to disinterest or inability to take the time to explore resources outside of those explicitly provided. Fortunately, some of the newer OER repositories are adding descriptive metadata which may quicken the process of searching for resources through popular search engines such as Google.

2.3.10 Technological affordances

Affordances are properties of objects which help define their use in various activities (Bærentsen & Trettvik, 2002). Community adoption of ICT-enabled tools for sharing and reusing digital teaching materials will likely vary by context depending on the user's perceived affordance of how technology can help them achieve their goals (John & Sutherland, 2005; Bower, 2008). What is not clear is how

educators perceive the affordances of ICT-enabled tools for sharing and reusing digital teaching materials and how this might hinder or help their pedagogical practices.

A specific consideration which may limit affordances and opportunities for reuse is the selection of certain file types. Certain digital file formats are not conducive to reuse as they require certain types of software or are difficult to edit. A file in a format which requires specific software will restrict reuse to those who have that particular software to edit or even view the contents. Additionally many popular formats such as the PDF make it easy for anyone to view materials, but quite difficult to copy and modify (Mason & Rehak, 2003).

2.3.11 Summary of reuse issues

In the previous section I explored the main issues around reusing digital educational materials which have emerged through the literature review. One can see that the challenges of reuse are complex and vary contextually, providing an interesting issue for research.

2.4 Methodologies employed in similar studies

Previous researchers of the reuse of educational materials have employed a range of methodologies from the analysis of website log files, case studies to ethnographic analysis. Studies generally focus on a single case or select group of teachers in order to understand the specific challenges and issues faced by educators in a certain context.

Several previous studies rely on transactional web log analysis to understand patterns of access to educational resources online (Harley et al. 2006; Petrides et al., 2008; Duncan, 2009). Transactional log analysis is the analysis of a file which records the communications (transactions) between an online system and the users of that system (Jansen, 2006). An analysis of these interactions can be employed to help understand how people make use of online systems and how resources are accessed. In many cases a transactional log analysis has been coupled with a qualitative method such as an interview with a group of individuals.

Petrides et al. (2008) used web log files to determine how people were accessing and modifying resources in a particular repository. This method requires that a repository be identified and accessed to measure reuse, but is limited in that it does not take into account the myriad other resources users may draw from.

Duncan (2009) measured reuse in the Connexions[28] learning object repository to determine how often materials were being accessed and reused. Materials which had been changed, or instances where derivative materials were created, may be identified through the transactional web logs which show if the object was modified or translated (Jansen, 2006). This method relies on the educator's return deposit of the material into the repository after modification.

Harley et al. (2006) administered a survey, conducted interviews, and used observational methods to conduct their large-scale study which focused on a population of educators from the humanities and social sciences. Harley et al. (2006) initially hosted discussion group sessions with 31 instructors from three institutions, which informed the survey questions. The survey was administered to

[28] http://www.cnx.org

faculty at a variety of institutions in California and had over 800 responses. Interviews were arranged with a selection of online digital resource providers, providing context on the supply side. This study adopted an ethnographic approach in order to describe the experiences of the educators reusing digital educational materials.

Masterman and Lee (2005) studied educators at three universities regarding their reuse of learning materials for English Literature studies. This study involved a survey and interview with educators, as well as a follow-up survey with students to determine how useful the resulting educational materials were. This study is significant in that it not only investigates the experiences in reuse, but also goes on to explore how the resulting materials were received.

Hatakka (2009) visited institutions in developing nations over two years, conducting interviews with a selection of participants and collecting surveys from a broader range of participants. Hatakka worked with both educators and content developers to gather a broad range of perspectives on how materials can be reused to create educational content and how useful this material is in teaching activity. Hatakka's study is particularly relevant as it challenges the notion that resources can be easily used in widely different contexts.

Bennett et al. (2004) and Conole et al. (2010) conducted workshops with educators which introduced them to the concept of OER and then supported them as they applied the idea to their own work. This approach enabled the researchers to explore changes in the participants' ideas as a result of the workshop and investigate how it may have changed their practice.

A common method used for research in this area is that of a case study. Investigating a group of individuals who work in similar conditions with a common objective provides an account of the "complex dynamic and unfolding interactions of events, human relations, and other factors in a unique instance" (Cohen et al., 2007:181). Masterman and Lee (2005), Petrides et al. (2008) and Hatakka (2009) all adopt the case study strategy, with Hatakka specifically defining his research as interpretivist in nature.

Philip and Cameron (2008) conducted a survey, used participant observation and conducted focus groups in their case study exploring the perceptions of pre-service teachers during their two-year education programme.

Sapire's (2010) research investigated the integration of OER designed for mathematics teachers at six higher education sites in South Africa. This large-scale study explored how OER could be useful for teacher education and each site constituted a unique case. Data was collected at each site via observation, questionnaires and interviews.

The methodologies employed in similar studies were considered before I drafted my own research design. This process will be discussed in Chapter 3.

2.5 Theoretical underpinnings of related studies

Many of the studies which share the promise of OER are theoretically quite weak. While there is a vast array of content available to people around the world, there is little in the way of a general theoretical understanding about how teachers integrate this content into their practice. Much of

the empirical work reviewed makes no mention of a theoretical base (Masterman & Lee, 2005; Harley et al., 2006; Petrides et al. 2008; Philip & Cameron, 2008; Duncan, 2009; Hatakka, 2009).

In searching for a theoretical base on which to situate my research, I explored the use of genre theory applied in a similar study by Kain and Wardle (2005). In this study, genre theory is used in conjunction with activity theory (Engeström, 1987) to investigate how genres are situated within activity and may be transferred between school and workplace settings. It was imagined that genre theory may be useful in explaining how individuals select resources based on the implicit genre of the material. However, there was limited research in this area, and I was more concerned with the perceptions of students around reusing digital educational materials, rather than an analysis of the materials' genre.

Harris and Higgison (2003) refer to communities of practice in supporting reuse within communities of educators. The concept of communities of practice (Wenger, 1998) is used to explain how individuals move from novice to expert whilst operating within a community. This speaks to the notion of shared practice and may explain how new members in the community service organisation learn to become successful from the more senior members. This does however not help us understand how educators at all levels, novice or expert, reuse available or potential educational resources.

Activity theory (Engeström, 1987) has been used as a lens to understand how groups of individuals act within specific social settings. Wetterling and Collis (2003) use activity theory to frame their discussion of an international network of educators sharing resources. Using the lens of activity theory, Wetterling and Collis mapped out the various social dynamics at play within the systems of activity they were interested in. Activity theory was used as a heuristic tool with which to examine their social practice.

Conole et al. (2008; 2010) use activity theory in a slightly different way from Wetterling and Collis (2003). Conole et al. (2008; 2010) posit learning materials to be the mediating artefacts, or tools, which are created as a result of, or used within, activity systems. The creation of the original educational material is the starting point for Conole's analysis. The creation of a learning object is the object of that initial activity, and the outcome, the learning object, becomes a potential mediating artefact to be used by others as tools in their own activity systems. Figure 2.4 illustrates how the object of one activity system may become the mediating artefact for another activity system.

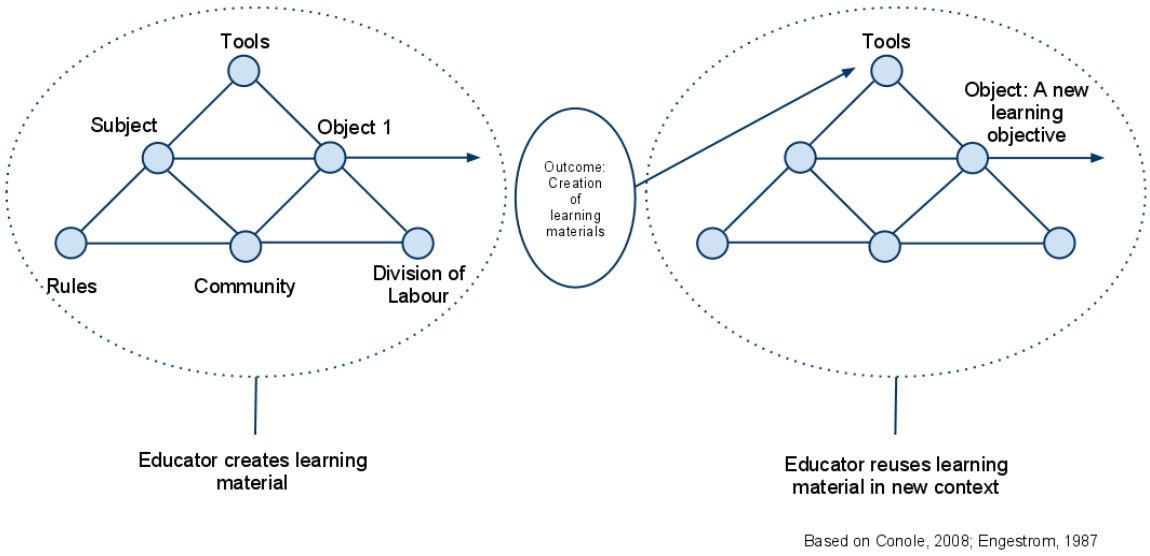

Figure 2.4 Outcome of one activity becomes a tool for others to use towards a new object

The question posed by Conole et al. (2008; 2010) is how tools designed in the context of one activity system can be appropriately repurposed within new systems of activity and new contexts. Note Conole's use of the word 'repurpose' as opposed to 'reuse', which I interpret to mean the integration of the educational materials into potentially new activities. This is understood to be in comparison with Wiley's understanding of reuse discussed earlier under the categories of 'revise' or 'remix' (Wiley, 2008), where materials are adapted for use in new contexts.

Using the lens of activity theory, it is possible to problematise how the contextual factors which enable the creation of a mediating artefact in one context differ from the contextual factors of someone trying to reuse that mediating artefact in a new context. This study attempts to understand the reuse of educational materials in new contexts and will therefore focus on the second activity system in Figure 2.4, where materials are reused in new contexts. I will use activity theory as a heuristic tool to examine the perceived issues around the reuse of educational materials.

2.6 Theoretical framework for this study

2.6.1 Collective activity in social context

This research examines the activities of members within SHAWCO using the lens of an activity system (Engeström, 1987). An activity system is an analytical tool with which one can examine collective or individual human activity as that which exists within a specific social setting (Parks, 2000). The activity system can be used as a lens to describe "object oriented, collective, and culturally mediated human activity" (Engeström & Miettinen, 1999:19). The theory can be useful to help explain and understand the activity of a collective in a particular context, such as the workplace or classroom (Engeström, 1987).

The concept of an activity system is derived from the theories of physical and cultural tools, mediation and the zone of proximal development offered by Vygotsky (1978). Vygotsky proposed that humans rarely act on the world directly, but rather act on the world through tools which have been developed to help us make sense of our world. Tools can be physical; such as a hammer, or

psychological; such as language or art. The tools we have available to us today have been culturally, historically and socially developed over time (Vygotsky, 1978).

External tools can be thought of as the artefacts we have created to store and share knowledge. Teaching materials are tools used to help mediate students' understanding of scientific concepts. The promise of OER is the potential for global access to high quality educational tools freely available via the internet. The challenge for educators is to find ways to use these tools in educational scenarios with vastly different cultural, historical and socially developed values. Activity theory will thus provide a lens with which to examine the perceptions of SHAWCO members working collectively.

2.6.2 The structure of activity

The collective object of an activity system has been described by Engeström (2000:964) as a "deeply communal motive". Leont'ev (1978) proposed a hierarchical structure for activity, which is comprised of actions and operations. This structure is represented in Figure 2.5, displaying how many actions may contribute to an activity; and how operations form the individual actions. The largest unit of analysis is activity, which is undertaken by the community who share a motive or objective; actions are carried out by individuals or groups and are defined by action level goals; finally operations are routinised actions which can be performed by humans or machines and are the lowest level of analysis.

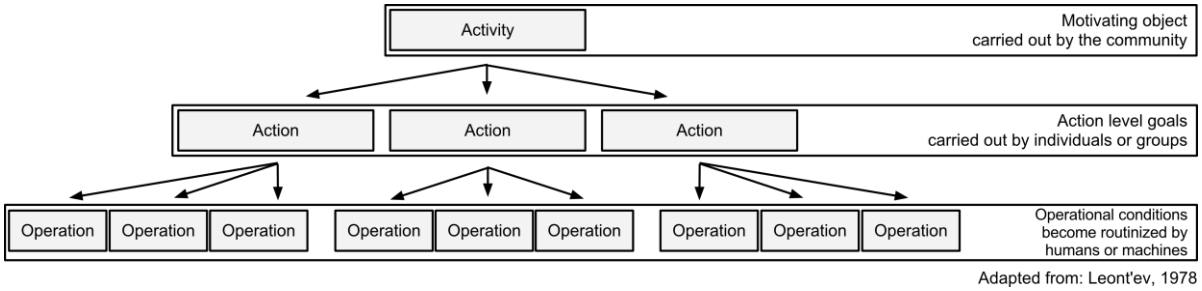

Figure 2.5 Leont'ev's theory of activity

Within this hierarchy we may find that within a system of activity not all actions are directly related to the collective object. The activity itself may be composed of a sequence of steps, each of which is not intimately related to the object; yet as a whole the sequence of steps may help to together achieve the object (Kaptelinin & Nardi, 2006). Leont'ev (1978) offers the example of learning to drive a manual transmission vehicle:

> *Initially every operation, such as shifting gears, is formed as an action subordinated specifically to this goal and has its own conscious 'orientational basis'. Subsequently this action is included in another action, which has a complex operational composition in the action, for example, changing the speed of the car. Now shifting gears becomes one of the methods of attaining the goal, the operation that effects the change in speed, and shifting gears now ceases to be accomplished as a specific goal-oriented process: Its goal is not isolated. For the consciousness of the driver, shifting gears in normal circumstances is as if it did not exist. He does something else: He moves the car from a place, climbs steep grades, drives the car fast, stops at a given place, etc. Actually this operation may, as is known, be*

removed entirely from the activity of the driver and be carried out automatically. Generally, the fate of the operation sooner or later becomes the function of the machine. (Leont'ev, 1978:66)

In the context of SHAWCO, educational materials are collectively created to help mediate knowledge through the object-oriented activities shared by volunteers and learners. The shared object here is the school learners' acquisition of knowledge and more broadly improving access to quality education. The importance of the collective motive of this activity is what activity theory emphasises. Yet, activity theory allows for the identification and examination of actions and operations in relation to this motive. Activity theory provides a framework to explore human activities which are directed towards some object, delineate activities from one another, and give meaning to what people do both individually and collectively (Kaptelinin & Nardi, 2006).

2.6.3 The activity system

Whilst operating within a system of activity, participants are subject to rules and the division of labour among members of the community. Rules and the division of labour dictate the order by which participants operate and delineate power and status (Murphy & Rodriguez-Manzanares, 2008). As these conditions of our environment provide affordance and resistance to our activity, Engeström (1987) proposed the activity system (Figure 2.6) to help explain how an individual's actions towards an object will be affected by a number of factors.

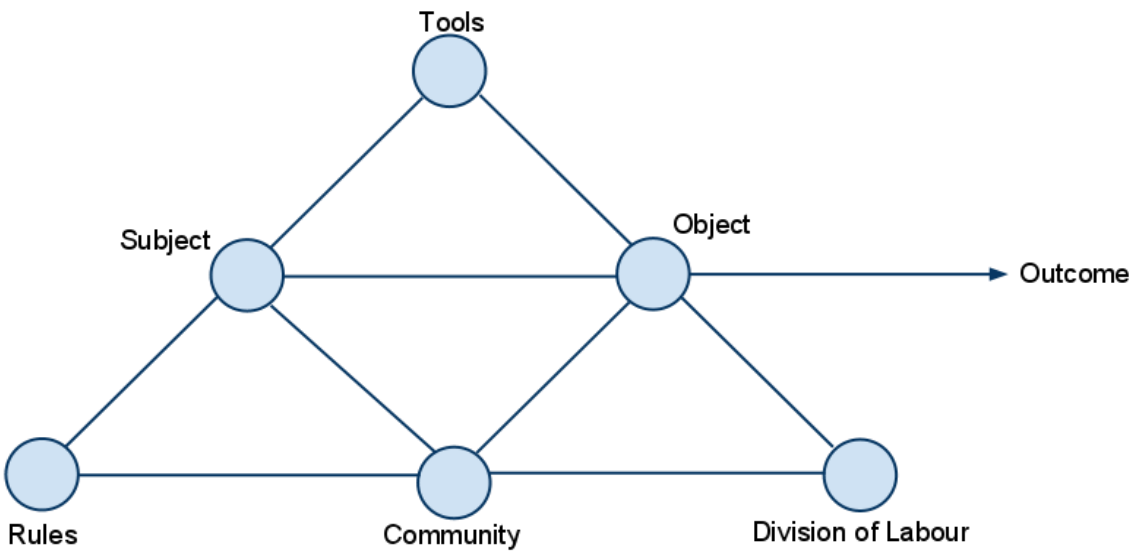

Figure 2.6 The activity system (Engeström, 1987)

The activity system (Figure 2.6) relates the subject(s) to the meditational tools being used; the community of other participants; the rules implicit in that community; and the division of labour which dictates the role of participants (Bellamy, 1996). Three important relationships can be defined in relation to the subject, object and community. The relationship between subject and object is mediated by tools; subject and community mediated by rules; and community and object mediated by the division of labour (Kuutti, 1996). Figure 2.7 shows these three mediating relationships within the activity system.

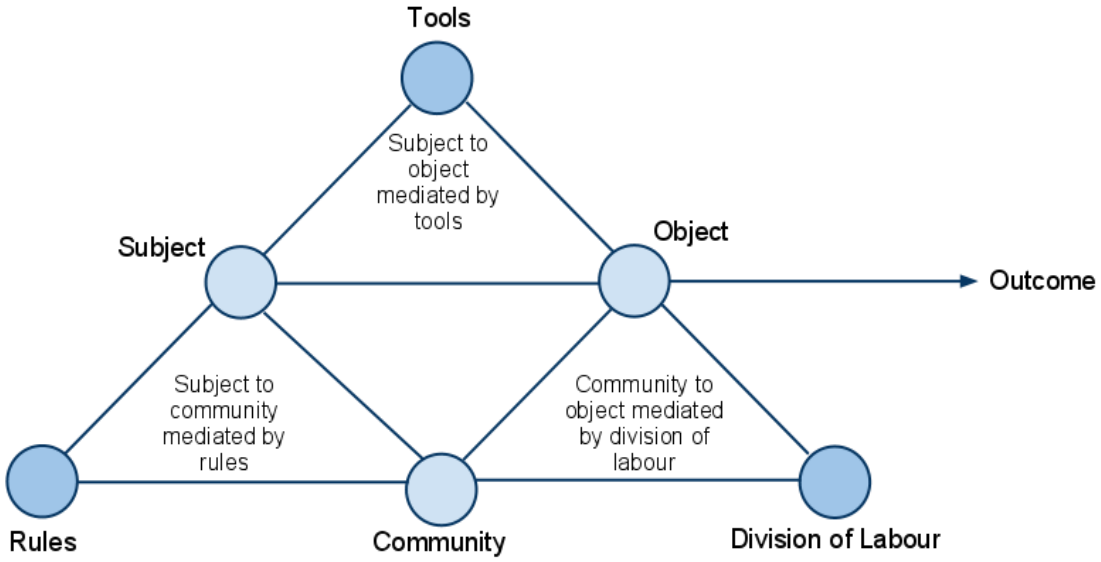

Figure 2.7 Activity theory's three mediating relationships

Activity theory can be useful for prompting questions such as: "How does the introduction of a new tool change the object of activity?" (Hardman, 2005); or "How do the rules implicit in an activity system impact one's ability to select appropriate tools?" (Russell & Schneiderheinze, 2005).

My research examines how educators perceive the reuse of educational materials within the context of their system of activity. I have examined perceptions in relation to the rules, notion of community, and division of labour bound within this object-oriented activity. Perhaps necessary at this point is an explanation of the elements of the activity system in the context of this study.

Subject

The subjects in this study are the SHAWCO curriculum team and as well as SHAWCO project members who contribute to the improvement of the curriculum, collectively referred to as SHAWCO volunteers. Moreover, I have explored the perceptions of volunteers in three distinct roles who are involved with curriculum design in SHAWCO: project leader, curriculum coordinator, and curriculum committee member (to be discussed further in Chapter 3).

Object

The object of the SHAWCO activity system can be identified as the iterative improvement of curriculum materials designed to help mediate school learners' learning.

Mediating artefacts/ tools

Tools may be physical or psychological and are culturally, historically and socially situated (Vygotsky, 1978). Language can be considered the most ubiquitous of psychological tools for communication (both written and spoken). The physical tools to be examined in this activity system are those ICT tools which are used in the development/improvement of the curriculum as well as curriculum materials in the form of books, manuals and electronic resources.

Rules

The rules which govern an activity system can be both explicitly expressed or implicitly inferred. Rules contribute to regulating the community's actions and interactions while operating within the activity system (Kuutti, 1996). The explicit rules within this activity system may be set by SHAWCO as a whole and may differ within the individual projects. For example, rules may be enforced around what types of curriculum materials may be used in the projects.

Community

The group of SHAWCO volunteers working towards the improvement of the curriculum constitutes the community in this activity system. This group comprises curriculum designers, technical support staff, student educators and project leaders. The community also includes the teachers and community members in which SHAWCO operates.

Division of labour

Division of labour relates to the roles, responsibilities and power that subjects in the activity system assume during the course of activity. As the study explores the perceptions of people in various roles in SHAWCO, I will be able to compare and contrast the understanding of roles and responsibilities and how this may be affecting the reuse of materials.

Outcome

The outcome is the result of the activity which may be anticipated or entirely unanticipated. The intended outcome of the SHAWCO activity system would likely be better prepared and successful school learners in the communities which they operate.

A preliminary sketch of the SHAWCO activity system model is proposed in Figure 2.8. The model draws out some of the themes and questions prompted by the literature review in relation to the activity system.

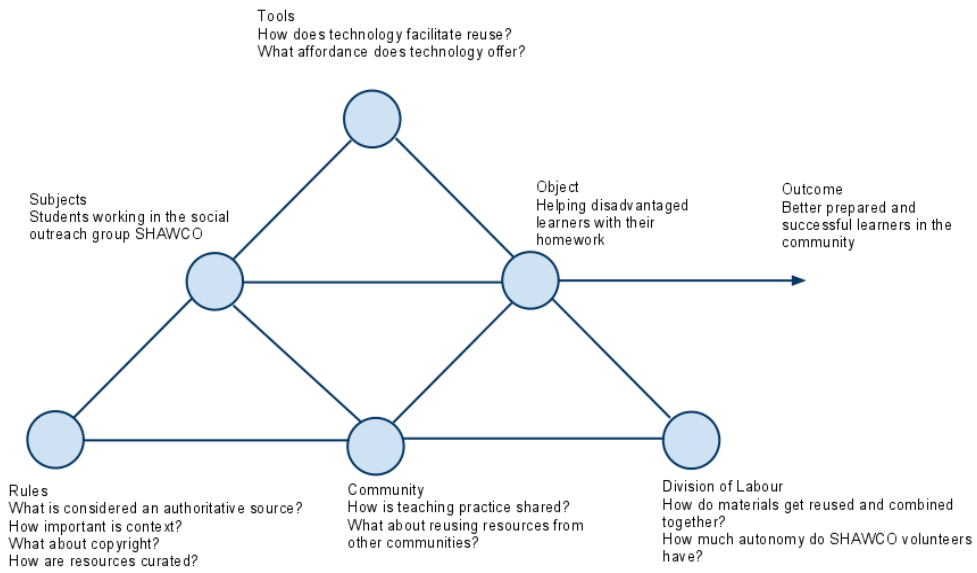

Figure 2.8 Activity system in relation to themes addressed in the literature review

2.6.4 Contradictions

A useful way in which activity theory handles questions such as these is through the notion of contradictions. Contradictions are "historically accumulating structural tensions within and between activity systems" (Engeström, 2001:137). Activity systems are not static and may be constantly changing through the adoption of new objects, being subjected to new rules or using new technological tools. When these changes happen, the new addition has the potential to collide or contradict with an existing established element of the activity system, such as how people divide labour amongst themselves or the implicit and explicit rules governing the activity. These contradictions can be useful to identify and understand how elemental changes lead to transformation. While contradictions potentially create a sense of unease for subjects within an activity system, they have the potential to lead to innovative change and development (Engeström, 2001). Contradictions, also referred to as tensions, then become a source of innovative work practices as the conditions in which object-oriented activity is situated changes over time (Barab, Evans & Baek, 2003).

The activity system model is used as an analytical framework to discuss the perceptions of students in SHAWCO. Contradictions or tensions within the system of activity will be used as a technique to identify innovation and changing practices. The research questions specifically seek to address how the rules, community, and division of labour impact upon students' perceptions and practice. The research questions also address issues around tool use; specifically, how new technology impacts upon their perceptions of how materials can be reused and shared.

2.7 Conclusion

This chapter has explored the available literature on the opportunities proposed by the open education movement; examined the issues around reusing educational materials; explored some of the issues around schooling in South Africa; unpacked the dynamic nature of voluntary social outreach groups; and explored the theoretical underpinnings of related studies before honing in on the theoretical base of this study which is activity theory. The following chapter will describe the research design strategy, sampling rationale, how data was collected, how data was analysed, and my overall approach to the study.

3 Research methodology

3.1 Introduction

In this chapter I define the research design process in detail. This research project aimed to explore the perceptions around the reuse of educational materials developed by student educators in the social outreach group SHAWCO at the University of Cape Town. The previous chapter explored how open educational practices have been adopted around the world and some of the challenges that educators have faced in reusing digital educational materials. This chapter will outline the research strategy which I adopted, provide details on how the data was obtained, explain how the data was analysed, and discuss ways in which I have attempted to minimise threats to the validity of the study while upholding ethical practice throughout the study.

3.2 Research approach

This research was conducted as an interpretive case study as I have sought to understand the meanings and interpretations of people acting in a specific social setting (Cohen et al., 2007). Having explored a series of case studies on teachers in various contexts and their experience of reusing digital educational materials in my literature review, I seek to contribute the perspectives of SHAWCO student educators to the corpus of research. Interpretive studies seek to "understand the subjective world of human experience" (Cohen et al., 2007: 21).

The case study approach is congruent with my decision to explore the perceptions of students working with SHAWCO, as case studies usually focus in on a particular community. Furthermore, as Cohen et al. (2007) write:

> *The purpose of such observation is to probe deeply and to analyse intensively the multifarious phenomena that constitute the life cycle of the unit with a view to establishing generalizations about the wider population to which that unit belongs.* (Cohen et al., 2007: 258)

The case study explores real people in real contexts, with an emphasis on understanding the context as a determinant of both cause and effect (Cohen et al., 2007). This allowed me to explore "the complex dynamic and unfolding interactions of events, human relationships and other factors in a unique instance" *(*Cohen et al., 2007: 253). This particular study explored the experiences of SHAWCO volunteers as they collaboratively constructed curriculum materials to be used in the community.

This study can be defined as exploratory or descriptive in nature according to the case study classifications developed by Yin (1984) and Merriam (1998) respectively. The case study approach was chosen as I wanted to investigate in depth the perceptions held by this group on how educational materials are reused.

3.2.1 Site selection

Founded in 1943 at UCT[29], SHAWCO has a long history of social responsiveness in the Cape metropolitan area. SHAWCO's two main projects focus on increasing access to quality education and improving the quality of health in impoverished areas. For this study I have focused specifically on the SHAWCO education projects. SHAWCO currently runs 11 education projects in Khayelitsha, Manenberg, Nyanga and Kensington. Each project has its own area of focus, age group and curriculum. The education project consists of approximately 80 committee members, 800 volunteers and impacts nearly 1 300 learners in the schools where they volunteer each year (Kaunda & George, 2009).

Every week SHAWCO volunteers go into the community to teach, following a curriculum which is selected and developed collaboratively by members of SHAWCO. The curriculum development process involves a number of stakeholders. Each SHAWCO project has a curriculum coordinator responsible for compiling the curriculum for the project. Additionally, each project has a curriculum committee advisor who aids and assists the project curriculum coordinator. Each project also has a project leader who is usually actively involved in overseeing curriculum design and project strategy.

The SHAWCO curriculum committee[30] is a new entity in SHAWCO, having been established only in late 2010. Historically, curriculum design processes were managed independently within each project. In the past couple of years, however, efforts have been made to centralise curriculum design and this became the role of one person, overseeing all of SHAWCO curriculua. More recently the curriculum committee was formed to help work with the projects and optimise curriculum design[31]. Specifically the curriculum committee aims to enhance current learning activities and come up with new ideas to improve education throughout the projects.

3.2.2 Participant selection

SHAWCO was chosen as a suitable site for this research project as I sought to explore students' perception of reusing teaching materials. As a well established social outreach programme with one of the highest participation rates in the Southern Hemisphere (Kaunda & George, 2009), SHAWCO is seen as a dynamic setting for exploring reuse and sharing of digital educational materials.

The criteria for participation in this study were that participants be involved in curriculum design in collaboration with the curriculum committee for one of the education projects. Participants for the study were selected using a snowball sampling methodology (Cohen et al., 2007) in combination with a stratified sampling strategy (Biggam, 2008). A person with a leadership role in the curriculum committee was identified and served as the entry point for identifying further curriculum designers. This person was helpful in identifying others who would be relevant to the study. It is understood that the snowballing method has the potential to introduce bias as participants working together may have similar attitudes and potential samples may be omitted for social reasons (Cohen et al., 2007).

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[29] http://www.shawco.org/page.php?pid=19

[30] http://www.facebook.com/group.php?gid=109172355808812

[31] Workshop participant 1, personal communication April 7, 2011

While the head of the curriculum committee suggested people for interview, I made a conscious effort to ensure that I interviewed people from multiple roles in the curriculum design process. Therefore, I have used a purposeful stratified sampling technique in combination with the snowballing method. This purposeful sampling technique is classified as stratified sampling. Stratified sampling involves breaking the target population into identifiable groups and then taking samples from each of these groups (Biggam, 2008). Having explored the structure and role-players involved in curriculum design, I was able to identify groups of people with various roles who were then targeted for interviews.

The initial design aimed to interview two project leaders, their curriculum design coordinators, and the associated curriculum committee members. I therefore had three identifiable groups from which to sample: project leaders, curriculum coordinators and curriculum committee members. The minimum sample size was set at six individuals for interviewing. The decision to undertake six interviews was an attempt to gather a diverse set of opinions within the constraints of a small-scale research project.

Contact was initiated with the head of the curriculum committee via Facebook. An initial meeting was planned, but then cancelled due to scheduling conflicts. I was subsequently invited to attend a SHAWCO curriculum debriefing and discussion workshop in early April 2011. The workshop was an opportunity for project leaders, curriculum design coordinators and curriculum committee members to discuss curriculum design processes.

A follow-up meeting was scheduled with the head of the curriculum committee to discuss the workshop and my specific research interests. The head of curriculum committee was able to suggest members of SHAWCO who were active and interested in curriculum design. A project leader and a curriculum committee member were suggested as potential interview candidates; thus beginning the snowballing process. Figure 3.1 illustrates the snowballing process, the arrows designate when interview candidates were suggested by others.

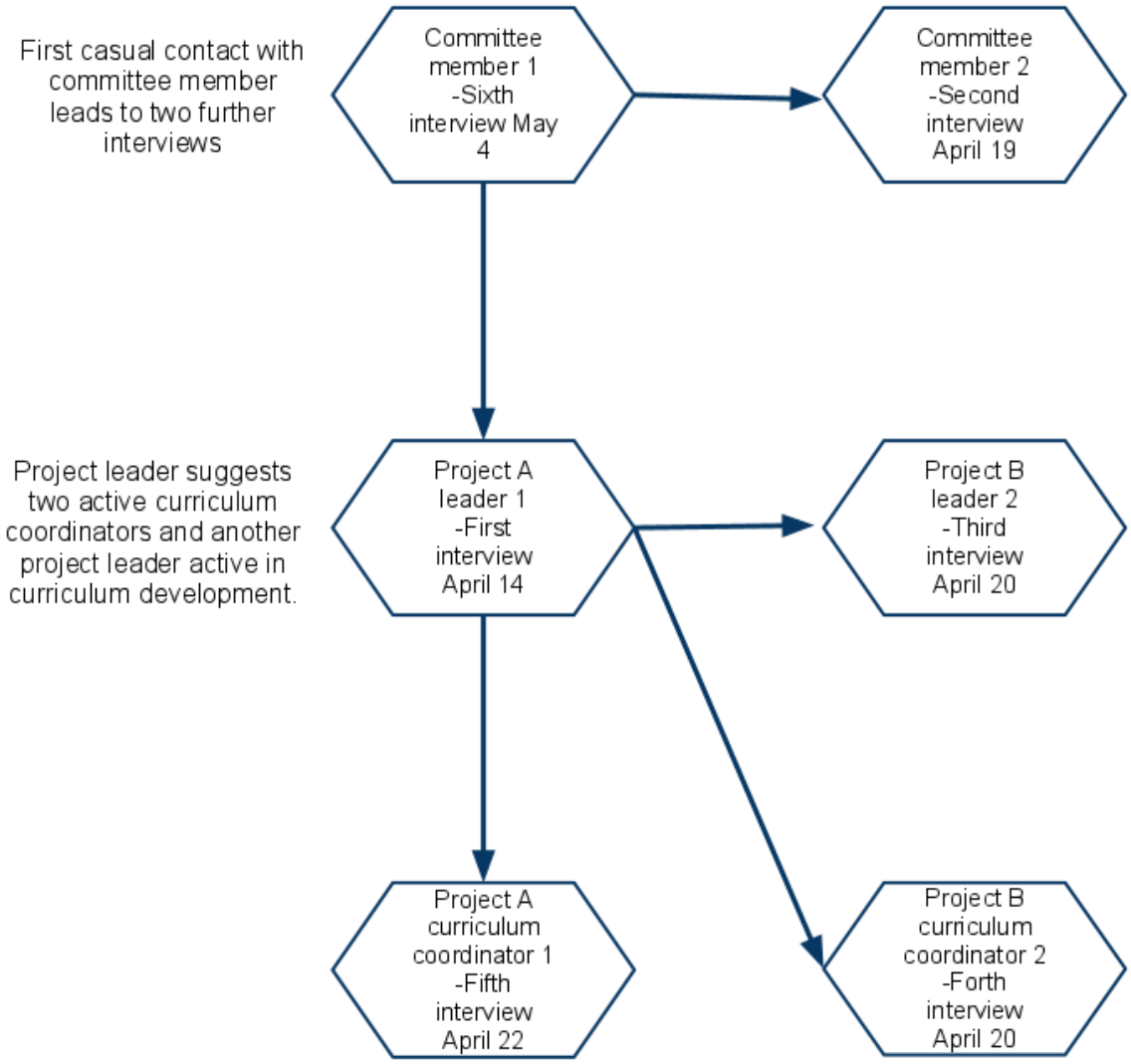

Figure 3.1 Snowballing process

A summary of the interviewee profiles is displayed below in Table 3.1. Interviewees all had at least two or more years of involvement with SHAWCO and came from various disciplines of study.

Table 3.1 Profile of interviewees

Faculty	Academic year	Years in SHAWCO	Role
Commerce	4th	3	Project leader
Humanities	4th	4	Project leader
Commerce	3rd	3	Curriculum coordinator
Humanities	2nd	2	Curriculum coordinator
Humanities (postgraduate)	2nd	5	Curriculum committee
Engineering and the Built Environment	3rd	2.5	Curriculum committee

3.3 Research methods

Empirical data was collected from interactions with SHAWCO in the April workshop and then during a series of semi-structured follow-up interviews. Concurrently, during April and May 2011, I was granted access to the SHAWCO curriculum database by a technical support member of the SHAWCO curriculum committee.

3.3.1 Curriculum workshop

On 1 April 2011 I was invited to attend a SHAWCO curriculum debriefing and discussion workshop held at UCT. This workshop brought together SHAWCO curriculum designers, project leaders, project curriculum designers, and student volunteers to discuss ways to constantly evolve and improve the curriculum. Sitting in as an observer in this workshop allowed me to document the broader issues SHAWCO curriculum stakeholders face and how they are collectively addressing the issues. The workshop also provided an opportunity to get to know some of the stakeholders outside of the core curriculum design committee; some of whom I would interview at a later stage.

3.3.2 SHAWCO curriculum database

During the April workshop I was granted access to the SHAWCO curriculum database which hosts and makes accessible SHAWCO resources to all participants. The SHAWCO curriculum database is hosted in the open source learning management system at UCT which is called Vula[32]. Vula has been developed at UCT based on open source learning management software known as Sakai[33]. Vula is primarily used for course sites, but also provides students a platform to create their own project sites.

The curriculum database is primarily used for sharing the resources which make up the curricula for all SHAWCO projects. The curriculum committee is trying to encourage the collaborative creation of curriculum documents using a wiki as well as prompting discussion around curriculum development using the forums available within Vula.

Access to the curriculum database was a useful resource for identifying the kinds of tools the curriculum committee was using. The database was an excellent example of how SHAWCO was trying to use technology innovatively to improve the curriculum. Having copies of the curriculum on Vula was creating opportunities for materials to be reused and adapted more widely. Vula is thus providing a platform for the curation of SHAWCO curriculum. As Vula provides a centralised repository where people can share and access educational resources, it has the potential to facilitate the distribution and reuse of education materials within SHAWCO. Additionally, Vula may be used to share and curate OER materials that SHAWCO volunteers find useful for the education programme. Figure 3.2 displays the Vula resources tool, showing how materials can be organised and displayed within a directory of folders.

[32] https://vula.uct.ac.za/portal/

[33] http://sakaiproject.org/

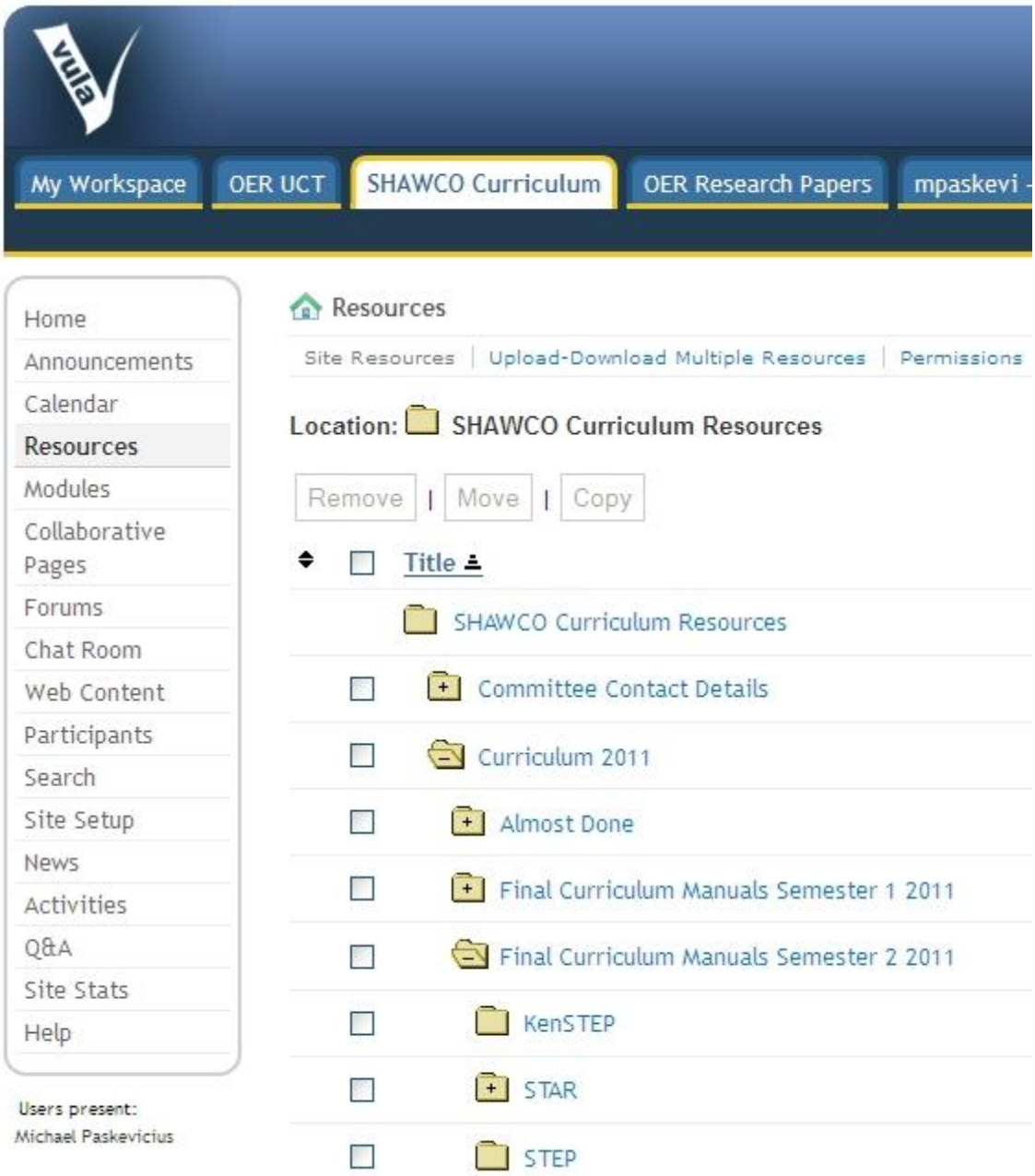

Figure 3.2 Resources for curriculum designers and stakeholders on Vula

3.3.3 Semi-structured interviews

A semi-structured interview schedule was designed to prompt discussion during interviews with SHAWCO participants. The interview schedule was designed to seek their perceptions on materials reuse according to the main issues identified through the literature review. Engeström's (1987) activity system has been used as a broad theoretical lens to help me categorise the themes for my study. I used the nodes of the activity system triangle to inform my research questions (Appendix A: Interview schedule) thereby providing an analytical framework on which to structure my investigation.

The interview questions were piloted in February 2011 with a colleague from the OER team in the Centre for Educational Technology. The pilot was meant to ensure the questions were coherent and

relevant to people involved in creating learning materials using appropriate terminology. The pilot was also a useful exercise for getting comfortable with the interviewing process and testing the audio recording device and transcription process. The pilot resulted in the rephrasing and re-organising of some of the interview questions, which in turn improved the interview schedule.

The predominantly qualitative and select amount of quantitative data collected during the interview was organised and analysed to gain an understanding of what perceptions SHAWCO members hold about the reuse of digital educational materials in relation to the identified themes. I used semi-structured interviews to probe for an understanding of what members of SHAWCO perceive to be limiting or obstructing their reuse of digital educational materials. Semi-structured interviews were particularly useful in this case as I interviewed a range of people with dissimilar roles. The semi-structured design of the interviews has allowed me to compare data collected across the interviewees (Cohen et al., 2007). The semi-structured nature of the interviews also allowed for flexibility during the discussion. In many cases interviewees wanted to raise and discuss their own issues, which became invaluable in surfacing issues not initially identified.

The interviews took place at the convenience of the interviewees. I asked each interviewee if there was a quiet place of their choosing where we could meet, but in each case they indicated that they did not have access to a private space. Therefore I identified a private office where the interviews could take place in the Centre for Educational Technology.

The interviews took a total of 223 minutes and ranged in duration from 35 to 42 minutes. The average interview time was 37 minutes. The interviews were recorded on a cellular phone with consent from the interviewees (Appendix B: Sample consent form). Each recording was then transferred to a computer so that a written transcription could be created. The audio files were captured and stored in the Waveform Audio File (WAV) format and were transcribed directly from the source file.

3.4 Data collection

During the curriculum debriefing and discussion workshop I took detailed notes of the key issues. These notes were sent to the head of the curriculum committee for review and an opportunity to comment (Appendix C: Workshop notes). In a verbal conversation with the head of the curriculum committee, I was assured that the workshop notes were accurate and acceptable.

As I was granted access to the SHAWCO Curriculum database hosted on Vula I was also able to collate and analyse the nature of the resources and activity on the site. An analysis of the types of file formats being hosted, the number of documents, how many document edits had taken place and how much participation was occurring on the site is presented in the following chapter. This analysis does not attempt to scrutinise the quality of the resources, but simply the collaborative nature in which materials are being edited, curated and accessed.

The recorded interviews were transcribed and entered into a Microsoft Excel spreadsheet (Appendix D: Interview scripts). The transcription process aimed to capture as much of the dialogue as possible including disjointed utterances which contributed to the conversation. The transcriptions were then proofread and any spelling errors made through data entry were corrected. The spreadsheets were then copied into Microsoft Word and formatted for readability. The audio from each interview was

listened to a second time as the transcripts were proofread once again. The individual interview documents were then sent back to each interviewee for review with an invitation to edit the document where necessary.

While preparing to analyse the data, all of the interview transcripts were consolidated into a single Excel worksheet (Table 3.2). Each interviewee was assigned a unique code (IntID) to keep the interview data separate as well as a unique code for each passage spoken (UttID). Additionally, each passage from all interviewees was also assigned a unique code (StackID) to maintain the integrity of the entire dataset. At this time the interview data was also anonymised to protect the identity of the interviewees and those mentioned within the interviews prior to analysis.

Table 3.2 Consolidated dataset with coding plan

StackID	IntID	UttID	Interviewe	Interviewee	Rules	Communit	DOL	Tools	Note
S0075	INT1	INT1075	You ment	Yea, you cant change words, that my kids wont understand. Um, but there is a PDF converter a software thing that [name omitted] taught us how to use! (laughs)				OC	
S0076	INT1	INT1076	So it mov	Yes it moves it to Word and then you can edit it which is so much easier. With that then you can just take parts of the lesson that you				OC	
S0077	INT1	INT1077	That's the	No just generally PDF.					
S0078	INT1	INT1078	The worst	Yes, then everything is a snapshot (laughs) that is how we use most of our, like graphs and stuff. But when you print it out it becomes a bit distorted because basically you have taken it as a picture and put it into your lesson. That is the worst part.				OC	
S0079	INT1	INT1079	So you ha	No its more like taking the parts you like and putting it together.			CCC		

3.5 Data analysis

This research uses the theoretical lens of an activity system to understand individuals operating within a group. Following the methodological work of Hardman (2008), the subject, object, mediating artefacts, rules, context and division of labour were the overriding categories in which my research questions were aligned and provided a framework for the coding of the data. Figure 3.3 provides an overview of my research questions in relation to the activity system.

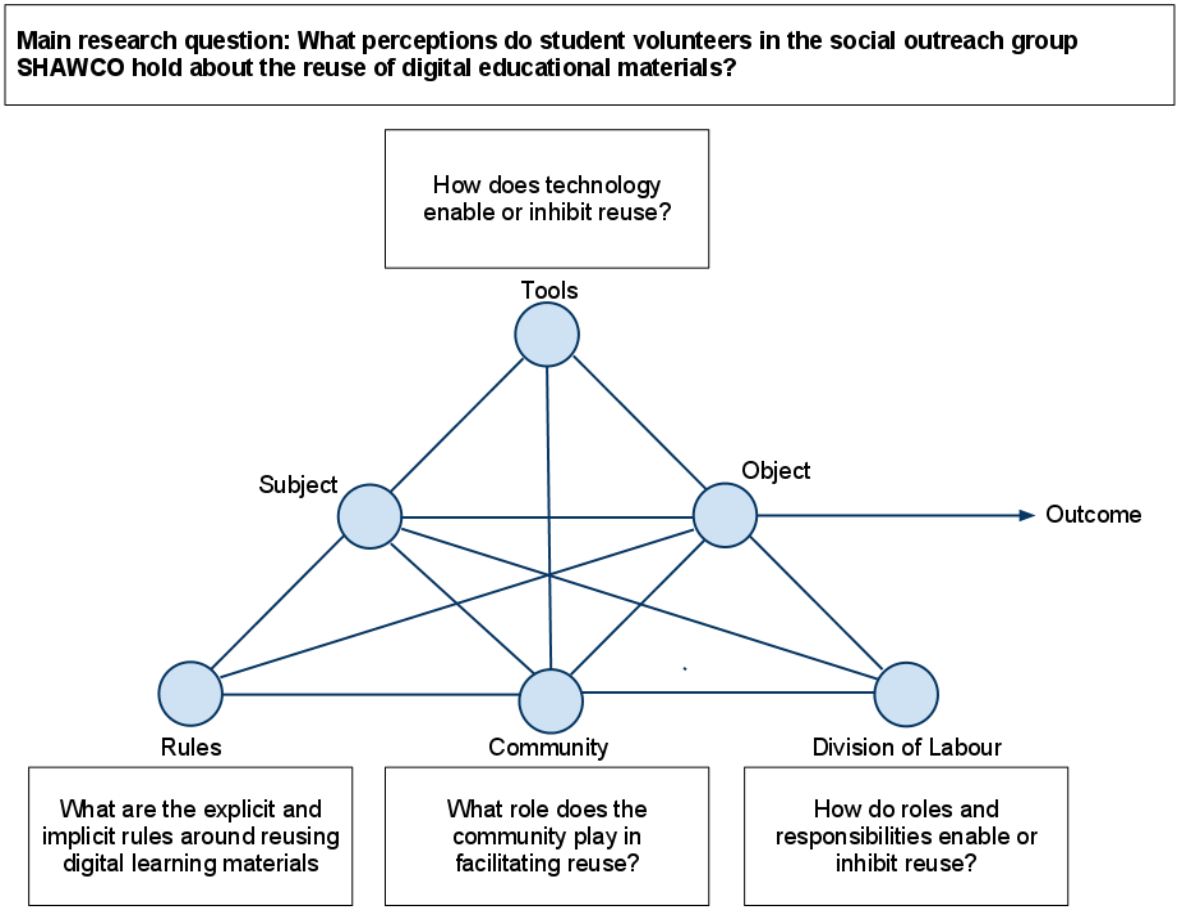

Figure 3.3 Activity system and research questions

Within each category questions were designed to address specific themes which had emerged from the literature review. Table 3.3 synthesises this design strategy by showing how the themes are matched to the activity theory concepts and the corresponding research questions (B1–B15).

Table 3.3 Themes in relation to research questions

AT Concept	Code	Research question	Research theme	Previous research
Rules	B1	How do you feel about reusing materials which have been created by others (or online) into your teaching/curriculum?	Reuse/ Adaptation	Conole, McAndrew & Dimitriadis, 2010; Elliott & Sweeney, 2008
	B2	How do you go about finding or developing suitable teaching materials?	Reuse/ Adaptation	Conole, McAndrew & Dimitriadis, 2010; Elliott & Sweeney, 2009; Hatakka, 2009
	B3	Do reused materials most often get used as is, modified, or mixed with other materials?	Reuse/ Adaptation	Elliott & Sweeney, 2010; Koper, 2003
	B4	If you have modified the materials in any way, how do you make this modified version available to others? (the REDISTRIBUTION issue)	Teachers autonomy	Petrides, et. al., 2010; Hatakka, 2009
	B5	How much flexibility do teachers in the field have to deviate from the set curriculum during a lesson or create their own lessons?	Teachers autonomy	Petrides, et. al., 2010; Koper, 2003

Community	B6	What is considered an authoritative source of teaching material for reuse? (Commercial texts, online resources, print material, government curriculum)	Authoritative materials	Bennett, Lockyer & Agostinho, 2004
	B7	How important is the context of a piece of learning material to your decision to use it?	Context	Bennett, Lockyer & Agostinho; Harley et al., 2006; Conole, McAndrew & Dimitriadis, 2010
	B8	How concerned are you about copyright when sourcing educational materials?	Copyright	Calverley & Shephard, 2003; Harley et al., 2006
	B9	How satisfied are you with VULA as the central place where SHAWCO materials are stored for reuse?	Curation	Calverley & Shephard, 2003; Conole, McAndrew & Dimitriadis, 2010; Hodgins, 2000
	B10	Do you find VULA also captures well documented learning activities as well as content?	Curation	Calverley & Shephard, 2003; Conole, McAndrew & Dimitriadis, 2010; Hodgins, 2000

Division of labour	B11	How do volunteers share teaching practice within SHAWCO and among the projects? (successes stories, excellent activities)	Teaching practice	Conole, McAndrew & Dimitriadis, 2010; Conole, 2008
	B12	How would you feel about reusing resources from other social organizations such as TeachOut or Ubunye? Why or why not?	Not invented here syndrome	Browne et al., 2010; Hatakka, 2009
	B13	Who else is involved in assembling and compiling your teaching materials? (Other SHAWCO students, lecturers? school teachers?)	Teaching practice	Conole, McAndrew & Dimitriadis, 2010; Conole, 2008

Tool use	B14	Which technologies do you use most for finding and sharing resources? (VULA, Email, IM, Gdocs, websites) How has this experience been?	Technology facilitating reuse	John & Sutherland, 2005; Bower, 2008
	B15	To what extent does technology enable or hinder your ability to share your teaching practice and resources with others in SHAWCO?	Technology affordance	Bærentsen & Trettvik, 2002; Bower 2008; Mason & Rehak, 2003; John & Sutherland, 2005

3.5.1 Data analysis technique and process

Data was explored and analysed in three ways: first the data was coded according to the research themes and then organised, presented and analysed in accordance with the research questions; the data was then interrogated on aggregate using word frequency analysis to capture a sense how different roles discuss the object of their activity; finally I scrutinised the data using the activity system concept of contradictions to explore tensions within the SHAWCO system of activity.

3.5.1.1 Data coding process

The data was coded in order to analyse the dominant themes which emerged in the data. The coding process was slow to start, as I read and re-read the scripts a number of times trying to

determine exactly how to begin selecting and applying codes. Miles and Huberman's (1999) work was useful in order to come to terms with the coding process, as they suggest that coding is not so much about the words you use, but the meaning which they hold. The coding process was thus seen as a way of organising the vast amount of data I had available to me and creating links between the various passages spoken during the interviews.

Creswell (2002) offers a useful method for developing and narrowing a coding system. This involves reading through the initial interview transcripts; identifying specific segments of information or themes; labelling the segments of information to create categories; reducing any overlap and redundancy among the categories; and finally creating a model incorporating the most important categories. Careful documentation of this process reveals how I worked from the initial qualitative data, down to a coded analysis.

Having reviewed the transcripts a number of times, a set of broad codes emerged which were used to further understand the thematic issues which were raised. Table 3.4 displays how I have linked the coding framework to my research themes and how they fit within my broader analytical framework of the activity system.

Table 3.4 Coding framework

AT Element	ThemeID	Theme	CodeID	Code
Rules	RA	Reuse/Adaptation	CR	Contextual relevance
	RA	Reuse/Adaptation	MA	Material evaluation
	RA	Reuse/Adaptation	RW	Reuse to avoid reinventing the wheel
	RA	Reuse/Adaptation	RTC	Provide real-time curriculum
	CC	Copyright	C	Issues of copyright
	CC	Copyright	CC	Creative commons
	TA	Teachers autonomy	AT	Autonomy of teacher
Community	AM	Authoritative materials	TB	Use of textbooks
	AM	Authoritative materials	RR	Referencing of materials
	CN	Context	LU	Use of appropriate language
	CN	Context	ST	School teacher engagement
	CR	Curation	CP	Curation process
	CR	Curation	VR	Versioning
Division of labour	TP	Teaching practice	CCC	Collaborative creation of curriculum
	TP	Teaching practice	SME	Volunteers knowing the subject matter and scrutinizing resources
	TP	Teaching practice	TO	Volunteer turnover
	NI	Not invented here syndrome	WS	Willing to share and reuse materials from other social organizations
Tool use	TF	Technology facilitating reuse	UT	Technology enabling
	TA	Technology affordance	OC	Challenges of using open content

While conducting the coding process I discovered that a number of the codes were being applied quite frequently to the data. At this time my supervisor was able to review a subset of my dataset and suggested the creation of sub-codes for the larger code categories. I therefore broke the larger coding groups into smaller sub-categories to further break down and organise the data. The codes which appeared most frequently and were subsequentially separated into sub-codes were: contextual relevance; material evaluation, reuse to avoid reinventing the wheel; curation process; collaborative creation of curriculum; and challenges of using open content. A summary of these sub-codes is displayed in Table 3.5.

Table 3.5 Summary of sub-codes for larger coding groups

CodeID	Code	SubCodeID	SubCode
CR	Contextual relevance	CR-E	Environmental relevance
		CR-C	Curriculum relevance
		CR-M	Need for locally produced materials
MA	Material evaluation	MA-Q	Ensuring quality
		MA-F	Getting feedback on materials
RW	Reuse to avoid reinventing the wheel	RW-I	Internal reuse
		RW-E	External reuse
		RW-A	Reuse conflicting with teachers autonomy
CP	Curation process	CP-D	Need for central database
		CP-F	Curating of specific formats
CCC	Collaborative creation of curriculum	CCC-D	Challenge of collaboration
		CCC-L	Logistical issues around collaboration
OC	Challenges of using open content	OC-V	Vastness of the internet
		OC-F	Formats
		OC-I	Accessiblity of resources

In order to display how I applied the codes to the various utterances from the interviews, I have selected an example for each code as well as the larger code groups which were further broken down. A selection of these coded utterances is displayed in Table 3.6. The notation "… " is used to show where utterances have been trimmed from the original dialogue. The code for 'referencing of materials' did not emerge in the interview data and is indicated by the grey shading in the table.

Table 3.6 Example of coding applications

Theme	Utterance	StackID
Contextual relevance / Environment	… Um, even though we have the exact same age group of kids who come from like similar circumstantial backgrounds and stuff like that we face completely different issues in terms of what we try to teach our kids and what our lesson outcomes would be. So um, yea. It's just that it's very different for different project leaders and coordinators.	S0010
Contextual relevance / Curriculum relevance	… I would rather them learn the basics than try and do what supposedly is appropriate at their level, or you know at their age group. Giving them something that they are not going to cope with, or that's according to the government standard doesn't solve any problems. It doesn't fix their basic needs.	S0039
Contextual relevance / Materials relevance	… And little kids still at grade 1, their world is themselves, so they want to learn about, or read about, themselves. So having textbooks, South African based textbooks just makes complete sense.	S0268
Material evaluation / Ensuring quality	Well past curriculum is available to us but without any evaluation whether they were successful or not. So that evaluation is I think crucial, I think if a lesson plan doesn't work, take it off the database make it not available to anybody so no one will make the mistake of using it again.	S0022
Material evaluation / Getting feedback on materials	No, when a volunteer group goes out, a project committee member who is your day coordinator. So it is just generally at the end of the session they ask volunteers, how the lesson went, were there any problems? And then we report back to those at our committee meetings that we have weekly.	S0057
Reuse to avoid reinventing the wheel / Internal reuse	And um the stuff that did work obviously should be reused, because I mean you don't want to reinvent the wheel. Which has been happening in the past and that, that is waste, that is a waste of valuable time and resources. So by reusing materials you can, you have a lot more time to improve on the weaknesses and come up with new stuff. So I think it's important to reuse stuff and material.	S0098
Reuse to avoid reinventing the wheel / External reuse	… You know we don't have the resources to be able to do it ourselves. And so therefore someone like PRAESA has curriculum which has been created. And therefore it makes so much sense to take their curriculum and use it.	S0248
Reuse to avoid reinventing the wheel / Reuse conflicting with teachers autonomy	Well, that has been like our major challenge, cause as you know SHAWCO leadership changes each year. So every person comes into this position wants to add something to the existing resources, but then sometimes they don't need that much change but because we are not guided by the feedback from the previous years, and that sort of thing.	S0153
Provide real-time curriculum	… Also textbooks generally follow it; the problems also are that curriculum in South Africa is always changing, so next year it's going to be completely different. They're coming up with something, I can't remember, CAP or something. So it's changing, but that information is available.	S0396

Autonomy of teacher	So, at the end of the day really the volunteer is pretty much in charge of what happens on the day. We can't control what happens. So I have gone out and seen, sometimes the volunteers don't even look at the curriculum. And it's quite frustrating (laughs). So they have absolute autonomy. No one is looking over their shoulder and telling them what to do, really. So they can choose to use their curriculum or not. Ideally we would like them to use it, as we think we have more experience, and we know a little about how to do it. Yea, but we have no real control, or mechanism to make sure it gets done in a particular way. So there is complete flexibility in that sense, but I would like there to be less flexibility.	S0393
Time	That is the other issue! Like half a year for us is a big deal! Literally now for this year, I mean for this semester, we have like four sessions left. And this Wednesday, and the next weekend we are done. So all though the rest of the first semester has been wasted in that sense.	S0198
Use of textbooks	Yes, I would say that in print would be more authoritative because then I know how to check the dates, the publisher. Maybe the date to just see how current it is, and then whether it's got any affiliations to education board or anyone. Whereas online, it's difficult, especially the way I was accessing curriculum, you just get the worksheets that pop up from...no (laughs)	S0263
Referencing of materials	Did not emerge	
Use of appropriate language	… The language issue is like one of our biggest barriers at the moment. Because, so far up to this point since 20 years ago we have been teaching English. And what we find is that most of the kids don't even respond, don't engage, don't even understand and that sort of thing. And as fun as we try to make it, it's never actually going to actually get through to them because of the language barrier. So that is why that next semester we would incorporate a mother tongue element to our literacy.	S0178
School teacher engagement	… We try to work with the teachers, which hasn't been very successful. Because, it is hard trying to do it without completely understanding how the whole community works and how their schooling works. Which I am just beginning to realize now. When I went to volunteer last semester, and then all of a sudden you are thrown into the job of doing the curriculum, and you don't realize all of these problems that come up.	S0351
Issues of copyright	In general we don't…I don't know our restrictions on what we are allowed to do and not allowed to do. So a lot of it is just that we are not really informed on what our rights are and what we are not allowed to do.	S0402
Creative commons	Yes Creative Commons the logos are usually there. And there are different licenses, some say you can only copy verbatim, or you can change it, and redistribute it. We are aware of that but I think that not everyone is aware of it in SHAWCO curriculum. So that is why we are trying to develop a system, so that everyone knows how to deal with copyright, and are aware of the different licenses.	S0114

Curation process / Need for central database	Basically that is been my involvement so far and, um ya I think the curriculum has been progressing quite steadily. One of the things we have found is we want continuity, as previously, A lot of the time the curriculum would be basically be developed from scratch each year. And now by using, um, a platform like Vula for example, where the content remains there and it can be reused and referred to again by future curriculum developers we are hoping that this will result in improvement.	S0094
Curation process / Curating of specific formats	No we keep the word version as well and we upload both of them so that they can modify what they need.	S0139
Versioning	... So we use Vula for that reason, but there is a problem with uploading resources, then editing it, then saving it again, cause then you have to save it as a new document, if you wanted to save it as Word in the resources folder thing…	S0404
Collaborative creation of curriculum / Challenge of collaboration	Um, Khayelitsha is using our maths program, but I don't know if they have changed it. The only problem with Vula at the moment is that there are so many folders and everybody has creative rights to do whatever they want . Like at the end of the day our curriculum was printed incorrectly because nobody knew which was the edited version.	S0084
Collaborative creation of curriculum / Logistical issues around collaboration	Most of the resources we use are online. A lot of people just Google search for worksheets, games, and information. I have found some really amazing websites which I try to make available to people. Because, I think it's also because they have to email it to me in soft copy. Often times they won't look at books, because it's just logistically difficult, they would have to scan things if they wanted. So it's easier to get things that are already in soft or electronic form so they can just copy and paste and email it to me.	S0385
Volunteers knowing the subject matter and scrutinizing resources	When I was overseeing…a lot of people, sometimes because they are experienced, sometimes because it's just a lot of effort, we just used information from the internet. And that was not always appropriate and not always adapted for the community, and not always adapted um…for the level of the kids. The other problem is that curriculum people are often just people, just volunteers, so they are not particularly interested in teaching, or not particularly interested in curriculum development. And people who are interested become project leaders and don't actually do the lesson material. So they don't always have insight into what needs to be changed. Anyway, so the expertise thing is a big issue, but usually they just Google it, and find information from that.	S0388
Volunteer turnover	Um, in general...I think…my feeling is always I can do it better, I want to fix it, and I want to improve it because our lesson material is always of a much lower standard than like professionally written materials. But then when I start getting down into developing and improving it, I see why, because it is a lot of work and it requires a lot of research and expertise which we don't always have, and I don't have. So sometimes it's just like you have a knack for these things. So its defiantly a challenge, there is always like this…I have been in SHAWCO for a while but because there is new leadership each year people want to come in and put their own stamp on it, and make it really good, and we have all this enthusiasm at the beginning, but then the actual implementation of making those changes is really difficult. Using current materials that they have already had, we have done that in some cases, where like the material is particularly good. But in most cases people try and do something different, and that's not always a good thing. Yea.	S0383

Willing to share and reuse materials from other social organizations	I think that the broad educational goals are quite different. But if there is a project which had the same educational goals made from the same curriculum, we should be collaborating. It would be stupid that we both go and do it.	S0284
Technology enabling	Um, in the UCT context Vula works really, really well, because everyone has access to it. You can't say you don't have access to it. And it's really easy to use. Obviously Vula does have its faults, you know. But in terms of sharing information and being an interactive platform. It's fantastic.	S0047
Technology hindering	I found the possible problem with it is that, its user friendliness for certain tools, for example like the wiki, or the forums. I think sometimes they require you to use tags, almost like HTML coding, which is not really user friendly for the average developer. So it would be good if the user friendliness could be improved. And also, in terms of using it as a database, space restrictions could be a hindrance. But we did apply for more space and they did give us more. Space could be increased for certain tabs, that would be nice.	S0117
Specific useful resources	The website with the free maths textbooks, I can get the URL for you. That is one of them that we use. The Department's website. Department of Education, that is pretty useful for guidelines and scope of education. And …I think we used other tools, but we use a lot of different websites.	S0129
Challenges of using open content / Vastness of the internet	Yea but really that is the problem! That is the problem, there are too many things and you don't know where to go!	S0088
Challenges of using open content / Formats	Ok well, we found that a lot of our resources and materials are in pdf format which you cannot modify, we have found a website that allows you to convert pdf to word. That has been quite useful, so we use that a lot. But it would be good to have a tool that could do that for us, instead of having to upload it online and then they usually email it back to you. ...	S0135
Challenges of using open content / Copyright	Well, it seems like there is some sites that give you worksheet, which obviously, like they sort of want you to use exactly their worksheet, and not change it. That sort of seems to be the thing which I wasn't too happy about. Because I didn't want to completely...like you can't copy it or anything. You could only print it out, and then use it. So that is what I was trying to work around.	S0331
Challenges of using open content / Accessibility of resources	Yea. At home I had uncapped internet, but then I got back to university I had capped internet and suddenly I was trying to upload these things onto the Vula site which is also sort of a bit of a problem because it was using up all of my internet cap.	S0359

3.5.1.2 Text frequency analysis

All text from the interviews was analysed according to the frequency in which key concepts were expressed by interviewees. This process enabled me to compare entire interview scripts against one another and present them in a single visualisation. On aggregate this provides a view of how people in different roles speak about their work and exposes some of the prevailing terminology that they use. The interviewees' text is organised and compared across people in different roles in the project. I have used this technique to explore how people speak about the object of their activity.

3.5.1.3 Exploring contradictions

In this section I discuss the key findings of the research using the notion of contradictions from activity theory. Contradictions are understood as tensions, ambiguity, or even innovations which can be identified in the cycle of activity. I understand contradictions to be areas where developmental change is happening, needed, or about to occur. Framing these tensions within the activity system provides me with a language to document and discuss the issues impacting upon students' perceptions.

3.6 Dealing with validity

This research project has been deliberately designed to minimise issues of bias, reactivity, and other threats to validity. I have made conscious efforts to address issues of validity based on the validity test checklist from Maxwell (2008).

3.6.1 Dealing with bias

It was my intention to be prudent in analysing and preparing data in a rigorous manner in order to maintain a minimal level of bias. In order to ensure the validity of my analysis I solicited the feedback of both my supervisor and the interviewees to ensure that I presented my findings according to the way things have been experienced by those interviewed (LeCompte, 2000). During the coding process my supervisor reviewed my initial coding applications to help validate my choices around how the data was coded.

3.6.2 Capturing "rich data" from the interviews

Verbatim copies of the interview process, captured as audio recordings, were meticulously typed up. In the preparation of the transcripts I attempted to capture the various pauses, utterances and moments of silence which occurred, providing a richer representation of what actually happened during the interviews.

3.6.3 Respondent validation

The written transcripts were sent back to the interviewees for review. Four of the six interviewees were able to validate the transcripts by signing off on the transcript approving them as an accurate representation of the interview. I sent a follow-up email to the remaining interviewees, giving them another opportunity to comment on the transcripts. At this point I also informed the interviewees that if I did not hear from them, I would have to assume they were satisfied with the transcripts.

3.6.4 Dealing with reactivity

Reactivity is the effect of the researcher upon the individuals being studied (Maxwell, 2008). Reactivity can potentially be seen as a real problem for qualitative researchers, especially when using interviews, as the interviewer sets the interview agenda and defines what is discussed. In an

attempt to minimize the effect of reactivity I endeavoured to give the interviewees room to discuss issues which they found relevant to the study. The semi-structured nature of the interview allowed for this, and in many cases questions and issues were raised which did not fall into the anticipated discussion. Many of these new issues arose naturally creating an even richer dataset.

In the process of conducting the interviews, I discovered that my own questioning and mannerisms in the interviews began to change. In listening to the first few audio recordings, I would catch myself interrupting the interviewee at times. As I proceeded I became much more conscious of my role as the interviewer and how it might affect the interviewee. I certainly learned great deal about my own conversational style through this process, and how leading questions may steer the interviewee in a certain direction. As a result of this process I am much more cognisant of the way in which I converse with others and feel I have gained valuable tacit research experience.

3.6.5 Triangulation of methods and people

In an attempt to triangulate the information available to me I have used a variety of methods to collect data. By using observational methods during my workshop participation, document analysis of the SHAWCO curriculum database, and interviews, I have endeavoured to generate a broad set of data which provides a rich account of the SHAWACO curriculum design process.

Due to the fact that I have interviewed a number of people with different roles in the curriculum design process, I am also able to triangulate results across stakeholders who are involved in curriculum design.

3.7 Research ethics

According to the UCT Code of Ethics[34] I have made a conscious effort to conduct the research:

- With scholarly integrity and excellence.
- With social sensitivity and responsibility.
- With respect for the dignity and self-esteem of the individual and for basic human rights.
- With reference to clearly specified standards of conduct and procedures ensuring proper accountability.

Consent forms were reviewed and signed by each participant at the beginning of each interview (Appendix B: Sample consent form). The consent form documented how the interview data would contribute to the study. Interviewees also had an opportunity to review their transcriptions and comment, clarify or change responses as they saw fit. Interview participants were assured confidentiality of their responses in the research report. Interviewees were assigned pseudonyms in the text to protect their identity. In order to maintain a high degree of ethical practice, all interview participants have had access to their interview transcript as well as the final research document.

3.8 Summary and emergent issues

In this chapter I have discussed my choices around selecting the SHAWCO project and the selection of the six research participants. I have explained my data collection processes of observation, analysis of the curriculum database on Vula and the semi-structured interviews. I have reflected on

[34] http://web.uct.ac.za/depts/educate/download/uctcodeforresearchinvolvinghumansubjects.pdf

how I conducted the data analysis and my thematic analysis methods. I have also discussed how I have attempted to minimise validity issues through documenting how I dealt with bias; captured "rich" data; validated the transcripts; dealt with reactivity and triangulated the data. In the following chapter I will use the theoretical framework I have selected to present and discuss my data.

4 Findings and discussion

4.1 Introduction

This chapter focuses on the mode of inquiry and how I analysed and interpreted the data gathered in the interviews. Although many wide-ranging issues emerged during the interviews, I focus specifically on the SHAWCO volunteers' perceptions of reusing digital educational materials. My key purpose is to explore the perceptions that student volunteers in the social outreach group SHAWCO hold about the reuse of digital educational materials.

4.2 Data analysis

All data was aggregated into an Excel spreadsheet once each individual interview script had been coded. This spreadsheet contained 434 passages, in which 259 codes were applied. The coding framework, as discussed in the previous chapter, was based upon the activity system elements in order to provide a lens for the analysis.

The research themes were situated within the activity system elements of tools use; division of labour; community; and rules. A summary of the total codes applied over all of the interviews within the broader activity system can be found in Figure 4.1. This diagram shows the number of occurrences for each code category and illustrates that overall the issue of rules was the most predominant.

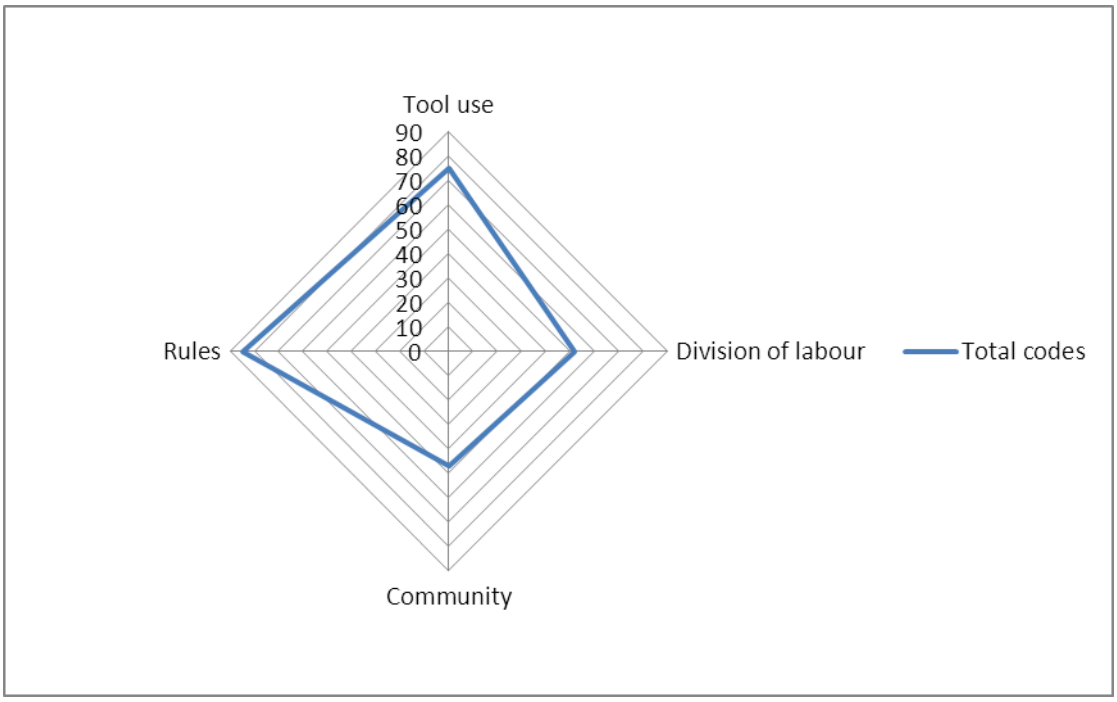

Figure 4.1 Summary of broader code occurrences

On a macro level the data most frequently pertained to rules and the use of tools. Issues around the community and the division of labour appeared less frequently, but almost equally. The interview transcripts contained 85 coded passages referencing implicit and explicit rules; 75 mentioned how tools impact on reuse; 52 codes applied to how people divide labour among themselves; and 47

passages were coded according to the role of the community. It is evident from the data that the rules around how materials get reused and which materials are available to be reused dominated the discourse.

I will now discuss the findings of the interviews following the order of the research questions. Within each research question I will discuss the thematic issues which have arisen in the order of prevalence. A summary of the broad coding schema and the themes which emerged within each broad code is presented in Figure 4.2. The activity system has been used as an analytical frame by which to organise the sub-codes.

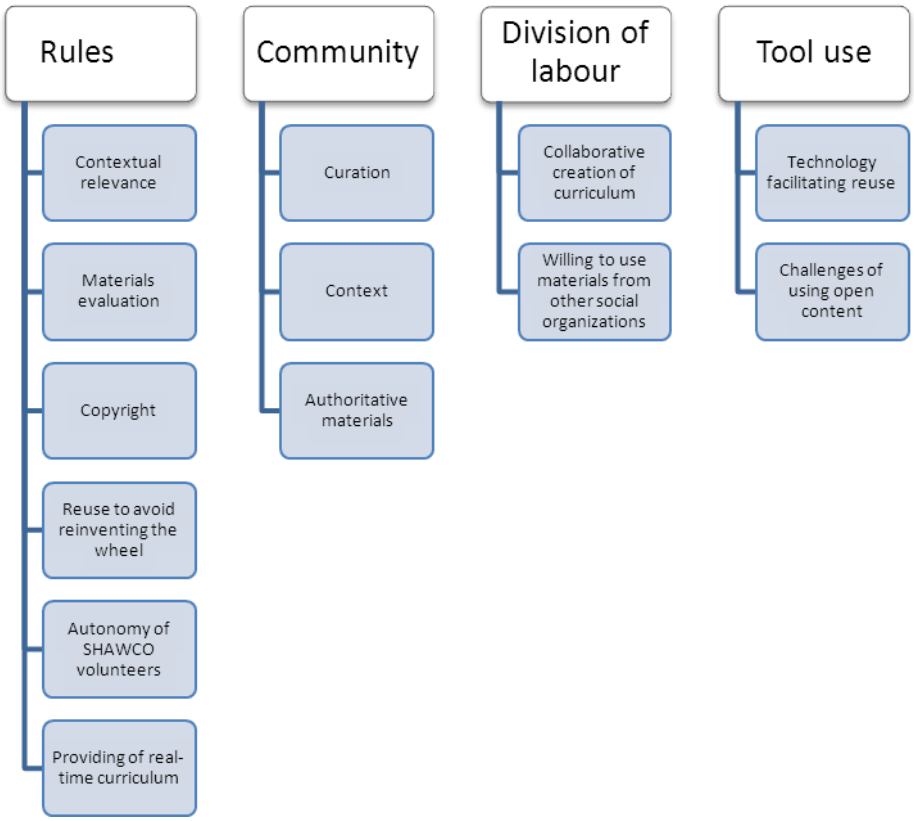

Figure 4.2 Broad coding schema

4.2.1 What are the explicit and implicit rules around reusing digital learning materials?

The degree to which educators will make use of existing materials in their own teaching can be understood in relation to the rules explicitly or implicitly defined by the organisation and broader operational context. This section explores how SHAWCO volunteers understood the rules around reusing materials. The major themes which arose in relation to rules were how people felt obliged to make choices around the contextual relevance of materials; how materials are evaluated; how reuse is encouraged to avoid reinventing the wheel; the need to provide real-time curriculum materials; variable understandings of copyright; and the level of autonomy SHAWCO volunteers have. Table 4.1 presents a summary of the frequency of codes applied to each interviewee with a summary of the total codes applied for each broad theme.

Table 4.1 Frequency of coded passages for rules

	Contextual relevance	Material evaluation	Copyright	Reuse to avoid reinventing the wheel	Autonomy of teacher	Provide real-time curriculum
INT1	6	6	5	-	2	-
INT2	5	4	3	1	-	-
INT3	-	4	1	2	-	-
INT4	3	3	3	5	-	-
INT5	5	2	3	6	2	-
INT6	3	2	6	-	1	2
	22	**21**	**21**	**14**	**5**	**2**

As displayed in Table 4.1, rules around the contextual relevance of materials dominated the discourse. Issues around how materials get evaluated, copyright and reuse to avoid reinventing the wheel were also frequently mentioned. A visual of the coding schema which was applied with regard to rules is displayed in Figure 4.3.

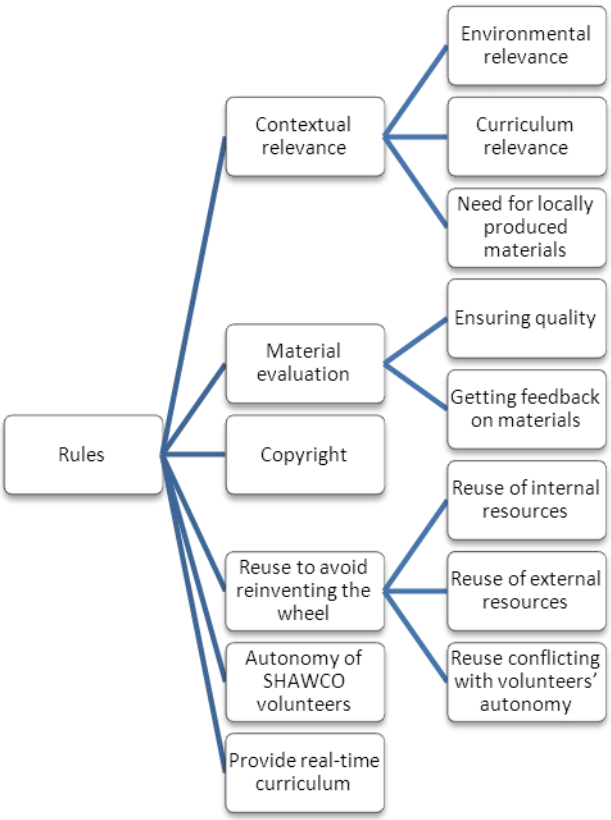

Figure 4.3 Summary of codes around rules

4.2.1.1 Contextual relevance

In terms of rules, the selection of contextually relevant materials was the greatest concern to this group of educators. Serving the needs of their specific learners was of the highest importance. Contextual relevance emerged as such an extensive theme that it was broken into three sub-themes: selection of materials contextually relevant to the environment; selection of materials contextually relevant to the curriculum; and the need for locally produced materials.

4.2.1.1.1 Environmental relevance

Cape Town has a very diverse population of people living radically different lives. The areas in which SHAWCO operate are impoverished township areas throughout the Cape Flats. Many of the respondents noted that when reusing materials they have to take into account which specific SHAWCO project it will be used for, in which area, and with which group of learners.

Interviewees noted vast differences in the quality of schooling in the various regions. Specifically noted were the differences in the level of the students' understanding of concepts expected at their age level. One respondent remarked that even when dealing with learners at the same age they "*sometimes […] might include more difficult content and difficult problems in the [Area A] curriculum*" (Interviewee 2, Curriculum committee). This is due to the disparity in the level of educational ability of students experienced by SHAWCO volunteers operating in the various regions. It was further highlighted by one respondent that: "*even teaching the same grades, like our grade 3 curriculum won't work for theirs*" (Interviewee 5, Curriculum coordinator). Learners of the same age within different areas required curriculum designed to suit their abilities and needs, as the following extract points out:

> *Even though we have the exact same age group of kids who come from like similar circumstantial backgrounds and stuff like that, we face completely different issues in terms of what we try to teach our kids and what our lesson outcomes would be. (Interviewee 1, Project leader)*

Understanding the environmental factors of the areas in which SHAWCO operates was generally regarded as one of the most important factors in the selection of materials for the curriculum. Interviewees also noted that anyone in a position of designing or selecting materials must have experience of working in that specific area, as this extract highlights:

> *If we were to design for a project we would have had to have gone to that project. And been to a lesson, and interact with the kids, and interact through the tutors. And we ascertain the knowledge of the kids, and how much they can, how much they do know. (Interviewee 2, Curriculum committee)*

This sentiment is further echoed by a project leader in this passage:

> *It's practically compulsory for you to volunteer because there is no way you can run a project without having been in it at all […] especially for project leaders, if they have volunteered in an organization they can relate so much more to the volunteers. (Interviewee 1, Project leader)*

Clearly an understanding of the learners and their learning environment is essential to providing a responsive curriculum. The implicit rule in relation to the selection of materials that seems to be emerging is that they must be relevant to the specific environment in which they will be used. With so many of the materials being selected and adapted to meet the specific environmental needs of the learners, it would also be useful if materials could accommodate multiple levels of understanding, and be easily adaptable in order to be of use in multiple contexts.

4.2.1.1.2 Curriculum relevance

SHAWCO does not follow the standardised curriculum set by the Ministry of Education, nor are they attempting to replicate the schooling environment which students experience each week. SHAWCO volunteers are "*playing this supporting role, [which is] more like an aftercare, or help program*" (Interviewee 5, Curriculum coordinator). While focusing on supporting the concepts covered in the national curriculum, this respondent went on to note that SHAWCO projects: "*… are trying to make it more fun and more interactive, [SHAWCO volunteers] give the children something different than what they get at school"* (ibid.).

While the selection of relevant materials relies on some understanding of the school curriculum, it appears that SHAWCO aims not to simply regurgitate the teachers' materials, but rather to use materials which bring an element of fun and interactivity to the lessons. The implicit rule which emerged around selecting curriculum content is that the materials need to be engaging and interactive while providing a playful space for learners. Sharing of teaching activities such as games could be especially useful here to enhance the quality of the educational content.

4.2.1.1.3 Need for locally produced materials

Frequently mentioned in the interviews was the desire for greater availability of South African educational materials. For the Life Orientation curriculum it was noted that international educational materials found online "*were not relevant for our children at all"* (Interviewee 1, Project leader). Another respondent noted that when trying to work with materials from international sources: "*… you can see that it's not you […] it's just far away*" (Interviewee 4, Curriculum coordinator). Finding education materials from South African creators was a priority for most "*because the stories are aimed at our children and the background our kids are from*" (Interviewee 1, Project leader).

Some of the resources found online were acknowledged to be adaptable with a little bit of work in order to customise the material for the context. One respondent explains that modifications "*could be small things like, you know, change [sic] the units, but also different methods of teaching, different methods of doing long division*" (Interviewee 5, Curriculum coordinator). Adapting materials from international sources was noted as a common strategy to meet the contextual needs of the learners. Making adaptations to fairly minor elements such as the measure of units or names of places, would likely be considered more feasible than trying to change the teaching methods embedded within the materials.

While online repositories of educational materials from South African educators are emerging, such as the Siyavula Project[35], UCT OpenContent[36] and Thutong[37], only three of the six interviewees made

[35] http://siyavula.org.za/

mention of any of these projects as useful resources. Growing awareness in the pool of South African-produced educational content could be very useful to organisations like SHAWCO. The implicit rule which appeared to emerge around selecting local versus international resources was to select local materials in the first instance and when necessary localise and adapt international materials to meet the context of the learners. Furthermore, respondents highlighted the need for quality assurance of materials regardless of whether they are internationally or locally sourced, as discussed in the next section.

4.2.1.2 Materials evaluation

Whether or not materials had been evaluated for quality, relevance and fitness of purpose were of great concern to the interviewees. It was generally agreed that curriculum materials used in previous years should be evaluated in order to be constantly improved. It would seem that the evaluation of materials is often done ad hoc on an individual project basis and little of the evaluation review is available to the larger SHAWCO community. Attempts are being made by the curriculum committee to make this evaluation process more transparent by storing the materials and the evaluation documents in Vula. Vula is also seen as providing a mechanism to enable many people to contribute to the review process using the collaborative functions available. This emerging system for evaluating materials is one that the curriculum committee is trying to cultivate among members in SHAWCO.

The two sub-themes which emerged around materials evaluation were the pursuit of quality and the need for specific feedback from student volunteers on how the materials work in the field.

4.2.1.2.1 Ensuring quality

Interviewees generally agreed that systems should be in place to preserve and curate good materials while removing poor materials. One of the problems SHAWCO volunteers currently face is having access to materials which have not been evaluated and/or are poor quality materials. There is no benefit in curating poor materials, as one respondent noted: "*… if a lesson plan doesn't work, take it off the database make it not available to anybody so no one will make the mistake of using it again*" (Interviewee 1, Project leader).

Materials evaluation is a costly process that requires some degree of governing organisational structure. The SHAWCO curriculum committee has set out to try and manage this process centrally by using Vula as a database and inviting all SHAWCO curriculum stakeholders to provide feedback on resources. Because the curriculum committee is still quite new, there were some misunderstandings around exactly how this will be operationalised. The curriculum debriefing and discussion workshop in April 2011 sought to address these misunderstandings by demonstrating the Vula platform and some of the feedback mechanisms available to the SHAWCO community. Getting volunteers to participate in SHAWCO curriculum evaluation on Vula has been a challenge, as one respondent noted:

> *We are trying to figure out what the best way for curriculum evaluation is; I think Vula is a really good forum. People have been using [the] general SHAWCO tab […] and writing their*

[36] http://opencontent.uct.ac.za/
[37] http://www.thutong.org.za

> *comments and asking questions. So people are actually using Vula to interact with SHAWCO, but not really for the curriculum, so that is something that we [are trying to] do.* (Interviewee 6, Curriculum committee)

Logistics around how materials get passed on each year also seemed to be a general concern among interviewees. Some resources were actually handed over as physical hard copies, making it very difficult for the next group of volunteers to adapt or improve the resources. One respondent noted that "*if you are not getting the soft copy of something, you are going to have to recreate it anyways, so you may as well change it*" (Interviewee 4, Curriculum coordinator). Resources handed over in hard copy were perceived to be too difficult to work with and therefore new volunteers were reluctant to adapt and improvise upon the existing content. Consequently hard copies of resources were either painstakingly recreated electronically or entirely new materials were created from scratch.

To encourage reuse and the iterative improvement of resources, materials must be curated as an electronically editable resource. Additionally, having thoughtful evaluations of the materials should help volunteers make improvements annually. Within the projects various systems were in place to try and address the quality issue. As yet no commonly accepted rule has emerged for ensuring quality even though the curriculum database was creating some opportunities for collaborative quality assurance.

4.2.1.2.2 Getting feedback on materials

Generally feedback on materials is collected by the specific projects and fed back to curriculum designers and more recently to the curriculum committee. This process was also reported to be happening in an ad hoc fashion, as this following extract demonstrates:

> *On the bus on the way back, we speak to the volunteers, and we ask them how was the curriculum? What would they change, was it too short, was it too long, how was the lesson, how was the response from the kids, did they understand it? And we take notes and, ideally we would want to upload that to Vula in a certain section and, so that next year's curriculum people can use that material to develop.* (Interviewee 2, Curriculum committee)

The feedback that comes in is often superficial and does not specifically address what could be changed within a lesson plan. As one respondent notes, the feedback they receive generally "*wouldn't be about like a specific lesson, it's more like a general impression that you get from that*" (Interviewee 5, Curriculum coordinator). While this is a fairly informal process, there have more recently been attempts to gather feedback on materials on a more formal and systematic basis using some of the functionality built into the Vula curriculum database.

Vula forums have been set up to allow volunteers to collaboratively discuss how to improve curriculum. Entire curriculum documents are copied and pasted into the forum for review and discussion. Project team members are encouraged to contribute ideas on how to improve the materials. In turn, curriculum committee members then make changes to curriculum in line with

forum comments. Additionally, the Vula wiki page has been established to allow people to add useful links and request help with specific curriculum issues[38].

Sound feedback and review mechanisms are essential to fostering reuse within a community of educators. Many OER repositories include rating and commenting features which provide a feedback loop for educators. Often even more specific feedback and evaluation is needed, especially among a community of educators addressing very specific needs such as SHAWCO. No explicit rules around collecting feedback have yet been established within SHAWCO. Feedback processes are often project specific, although the centralised curriculum database is creating opportunities to make this process more open.

4.2.1.3 Copyright

This section explores how explicit and implicit rules around copyright impacted on how resources were selected, reused and shared within SHAWCO. Interviewees generally had an awareness of copyright, but were unsure how to manage specific copyright issues as they reused materials. There seemed to be a misinterpretation about resources found online which were understood to be "freely available" (Interviewee 1, Project leader; Interviewee 6, Curriculum committee), and the specific legal terms under which these online resources had been released. An important distinction must be made between content that is freely available online, and content that is openly licensed and legally useable.

A number of the respondents mentioned that the materials they sourced on the internet were not being used for profit, implying that the reuse of these materials should be acceptable under fair use. As one respondent noted: "*we are non-profit organization [...] so I mean we are not using the resources for profit. But um, if a material is copyrighted, I think it should be referenced*" (Interviewee 2, Curriculum committee).

Interestingly, when using online materials one respondent noted she was much less concerned about copyright in comparison to a physical printed resource. The interviewee remarked:

> *I guess it's sort of a bit of a difference, like if it's an actual form you feel like copyright is more important then something that is sort of available to you anyway on the internet but not necessarily like, to reproduce. It's a bit more vague, maybe not taken so seriously.*
> (Interviewee 5, Curriculum coordinator)

All of the respondents interviewed noted that SHAWCO could benefit from greater awareness on copyright. The curriculum committee was investigating systems to help SHAWCO increase access to information around copyright issues. However the pressures of time and priorities prevailed as one respondent noted: "… *usually it's a scramble to get the really basics done, and concerns about copyright and referencing is not really our biggest worry*" (Interviewee 6, Curriculum committee).

When asked about alternative copyright licensing models such as Creative Commons, only two of the six respondents were aware of open licenses. One of the respondents who was aware of

[38] Ascertained at the Vula SHAWCO curriculum debriefing and discussion workshop – See Appendix C: Workshop notes

Creative Commons seemed to have a conflated understanding of Creative Common, as illustrated by this remark: "… *my experience with Creative Commons is viewing it from an academic point of view and from a business point of view, for profit*" (Interviewee 4, Curriculum coordinator). The other respondent, who was aware of open licensing, noted that there was a need for a greater understanding of alternative copyright licenses in SHAWCO and that the curriculum committee was trying to address this need.

When uploading resources into Vula one respondent noted that there was an option to specify the licensing of the document being added. The respondent noted that this option could be useful as it provided a space to indicate the legal terms of use. However, the respondent did note that the options available for selection were not really useful as indicated in the following extract:

> *I think on Vula, there is like a thing when you upload a resource you have to say whether it's copyright. I thing we, or I usually put up, I am not sure. Like there is an "I am not sure" option (laughs). I don't know whether this is allowed or not, but that is the option I pick.* (Interviewee 6, Curriculum committee)

When adding a document into Vula there is an option to add further details to the file being uploaded. The 'Copyright Status' selection contains the following options: 'Material is in public domain'; 'I hold copyright'; 'Material is subject to fair use exception'; 'I have obtained permission to use this material'; 'Copyright status is not yet determined' and finally 'Use copyright below' which allows the user to add their own copyright terms in a text box. Presumably, the interviewee is referring to using the 'Copyright status is not yet determined' option, which provides little detail to anyone who discovers the file online. Vula currently does not have specific options for Creative Commons licences.

Respondents were generally well aware of copyright issues and commonly noted them as a challenge. It appeared that the unwritten rule was that fair use would protect them from copyright infringement. Implicitly it was by and large understood that content found on the internet was free to use for educational purposes. A genuine need was noted for greater explicit rules around copyright management in SHAWCO as well as for more intuitive features built into Vula to help manage the copyright status of documents.

4.2.1.4 Reuse to avoid reinventing the wheel

With an available pool of electronic resources, new volunteers should be able to reuse existing materials from previous SHAWCO curriculum materials and not have to start creating materials from scratch each year. While this appears to be an implicit rule in SHAWCO, it does seem to depend greatly on the availability of existing materials, the format in which they are available, and the handover process as senior volunteers leave the project and new ones join.

Interviewees' views on this theme were multifaceted, so this section is broken down into the reuse of internal resources; reuse of external resources; and reuse conflicting with SHAWCO volunteers' autonomy.

4.2.1.4.1 Reuse of internal resources

Starting from scratch each year is seen as wasteful and volunteers are encouraged by the curriculum committee to reuse materials as much as possible. As one curriculum committee member explained: "*… by reusing materials […], you have a lot more time to improve on the weaknesses and come up with new stuff*" (Interviewee 2, Curriculum committee). Building on what works, and improving on what does not, is the practice overtly endorsed by the curriculum committee. Curriculum committee members expressed a hope that Vula would help to encourage reuse by providing a platform where material can be shared and curated.

Despite the enthusiasm for reuse to avoid reinventing the wheel, one curriculum designer noted that she was unsure of the rules around reusing other people's materials discovered on Vula:

> *I wasn't actually sure, like some of the stuff that was being posted online that other projects had made, I wasn't actually sure if it was ok to take it now, or if you should ask the person for permission. Like, I didn't really know what the agreement was now.* (Interviewee 5, Curriculum coordinator)

Reusing materials among projects in SHAWCO seemed to be of greater concern than reusing materials found online. There was an explicit concern around plagiarism as this respondent went on to explain: "*I didn't just want to take this work and present it as my own"* (ibid.); as well as acting covertly: "*I didn't want to go behind someone back*" (ibid.). Evidently the rules of engagement around reusing internal resources could be less ambiguous and much more explicitly stated. What is interesting here is that SHAWCO volunteers appear to be conscious of the rules around plagiarism, but not sufficiently aware of exact strategies to avoid it.

While implicitly reusing resources within SHAWCO appears to be the most logical option, the uncertainty around exactly how resources may be reused when found within Vula needs to be clarified. Open licensing of materials may help to reduce the ambiguity around what options one has to reuse a resource they have found in the database. Alternatively, more explicit communication around the rules of reusing others materials could be established by the curriculum committee.

4.2.1.4.2 Reuse of external resources

Based on the interviews it was clear that using materials from online sources was a popular method to gather ideas for the curriculum. No one respondent had found a single website or resource which met all of their needs. Often a multitude of resources were combined to form the curriculum materials, as one respondent explained: "*I didn't find like one good site which could cover everything"* (Interviewee 5, Curriculum coordinator). Many of the ideas for the curriculum were sourced from a variety of websites and "*adapting and mixing them*" (ibid.). It was noted that volunteers generally had to spend quite a bit of time adapting internet resources in order to make them relevant for this context.

While external resources were frequently mentioned as useful, the implicit rule uncovered here is that these materials would most often have to be adapted to match the project context. SHAWCO volunteers had an implicit understanding that they were responsible for ensuring the materials were contextually relevant and appropriate.

4.2.1.4.3 Reuse and SHAWCO volunteers' autonomy

It was mentioned that as new volunteers join the projects, especially in leadership roles, they frequently want to personalise the curriculum materials according to their own style and approach; often reflecting deeper more personal aims.

> *So every person comes into this position wants to add something to the existing resources, but then sometimes they don't need that much change but because we are not guided by the feedback from the previous year's […] It has always been a challenge, to maintain what is there and to add on what is missing.* (Interviewee 3, Project leader)

Finding a way to maintain continuity in the curriculum, maintaining the quality and improving iteratively, was seen as a concern to those currently in leadership roles. Finding a way to document the choices made by project leaders in choosing and refining the curriculum appears to be tacit knowledge which is frequently lost through turnover. One respondent reflects upon this in the following extract: "… *we all try to start something, we make mistakes, and we never learn from them because someone starts again and makes the same mistakes*" (Interviewee 4, Curriculum coordinator).

The challenge of passing on that tacit knowledge, which reflected the choices around curriculum design, was mentioned as a major challenge.

> *It's really hard to pass those broad aims over. You tend to just hand over logistics. So I have been thinking about how do you do that? Do you create a blog? As you are creating your curriculum, do you blog those kinds of ideas? In order to pass them on to someone. Because it's also very different if you relay your thought process in a single, even if you wrote a page at the end of your term of office, it would be very different to an actual continuous stream of thought.* (Interviewee 4, Curriculum coordinator)

Evidently the construction of a curriculum to match the contextual needs of the specific learners becomes quite a personal journey for SHAWCO volunteers. The documenting of the practices and thought processes which go into curriculum design would be a useful artefact for future project leaders to review prior to beginning their leadership term.

The implicit rule which emerged around autonomy was that project leaders within the various projects were given a high level of autonomy over the curriculum. Project leaders were able to make changes annually to match their individual project goals. It was noted that these personal motivations could be better shared with new project leaders annually to ensure continuity of the curriculum.

4.2.1.5 Autonomy of SHAWCO volunteers

Despite the desire for flexibility in lesson plans, respondents report that there are core materials which need to be covered in order to provide some value for the learners. The curriculum materials provide a baseline for what needs to be covered in the lessons. One respondent did however note that it can be a challenge to get volunteers to cover specific curriculum content if they are uninterested in the subject matter: "*If you have a volunteer who hates maths, (laughs) you know*

there is nothing you can do! We teach maths every single day, it is not optional" (Interviewee 1, Project leader).

Volunteers in the field ultimately have a great deal of autonomy and generally run the lessons as they see fit. The curriculum materials provided are meant to guide the volunteer, but as one curriculum committee member points out:

> *I have gone out and seen, sometimes the volunteers don't even look at the curriculum. And it's quite frustrating (laughs). So they have absolute autonomy. No one is looking over their shoulder and telling them what to do, really. So they can choose to use their curriculum or not. Ideally we would like them to use it, as we think we have more experience, and we know a little about how to do it. Yeah, but we have no real control, or mechanism to make sure it gets done in a particular way.* (Interviewee 6, Curriculum committee)

The fact that volunteers in the field are neglecting to use the curriculum materials prepared by SHAWCO is unsettling considering the time spent on preparation and efforts towards evaluating the curriculum. If volunteers are not using the prescribed curriculum they presumably are sourcing materials and ideas from other places.

Overall the participants expressed a desire for more explicit rules around volunteers using the curriculum as a formal base for their lessons. There were no generally accepted explicit or implicit rules around dealing with volunteers' autonomy and ensuring they adhere to the curriculum.

4.2.1.6 Providing real-time curriculum

In addition to the curriculum having to be contextually relevant and of high quality, it also must be flexible enough to allow space for a volunteer in the field to improvise where needed. As previously stated, the curriculum is meant to be fun and interactive and does not follow a rigid structure. In the curriculum debriefing and discussion workshop, a request was made for some documented techniques on how to improvise in the classroom. SHAWCO volunteers could be provided with a list of 'go-to' activities for those instances when the students are tired, disorderly or distracted.

There don't appear to be any explicit rules around creating dynamic and flexible real-time curriculum materials. Volunteers are allowed and encouraged to improvise with the materials provided in order to give the learners the best possible experience.

4.2.1.7 Summary

The interviews with SHAWCO volunteers enabled me to explore the implicit and explicit rules governing their activities. The need to use contextually-relevant materials for the specific education projects dominated this discussion. Additionally, the need and desire for more explicit rules around timely and thorough evaluation of materials emerged as a significant issue. The next section addresses the second subsidiary research question on how the community facilitates the reuse of educational materials.

4.2.2 What role does the community play in facilitating reuse?

This section explores themes which emerged around the community in which SHAWCO operates. This community includes the various student volunteers and the community at large in which the projects operate. I have included the issue of curation in this category, as I understand the curation

of materials to be a process very much dependant on the community of users. Specific themes which emerged here are: how materials are curated within the SHAWCO community; contextual issues in relation to the community; and how people perceive certain materials as more authoritative then others. Table 4.2 presents a summary of the frequency of codes applied to each interviewees' response with a summary of the total codes applied for each broad theme.

Table 4.2 Frequency of coded passages for community

	Curation	Context	Authoritative materials
INT1	1	6	-
INT2	3	2	1
INT3	6	5	1
INT4	5	1	2
INT5	2	2	1
INT6	6	2	1
	23	**18**	**6**

As displayed in Table 4.2 the need for curation of materials within the SHAWCO community was the greatest issue in relation to materials reuse. Figure 4.4 displays a summary of the coding scheme and sub-codes related to community. The specific sub-codes which emerged included: the need for a centralised database; the curation of specific file formats; accurate versioning of documents; use of textbooks; teaching in appropriate languages; and finally engagement with school teachers and community members.

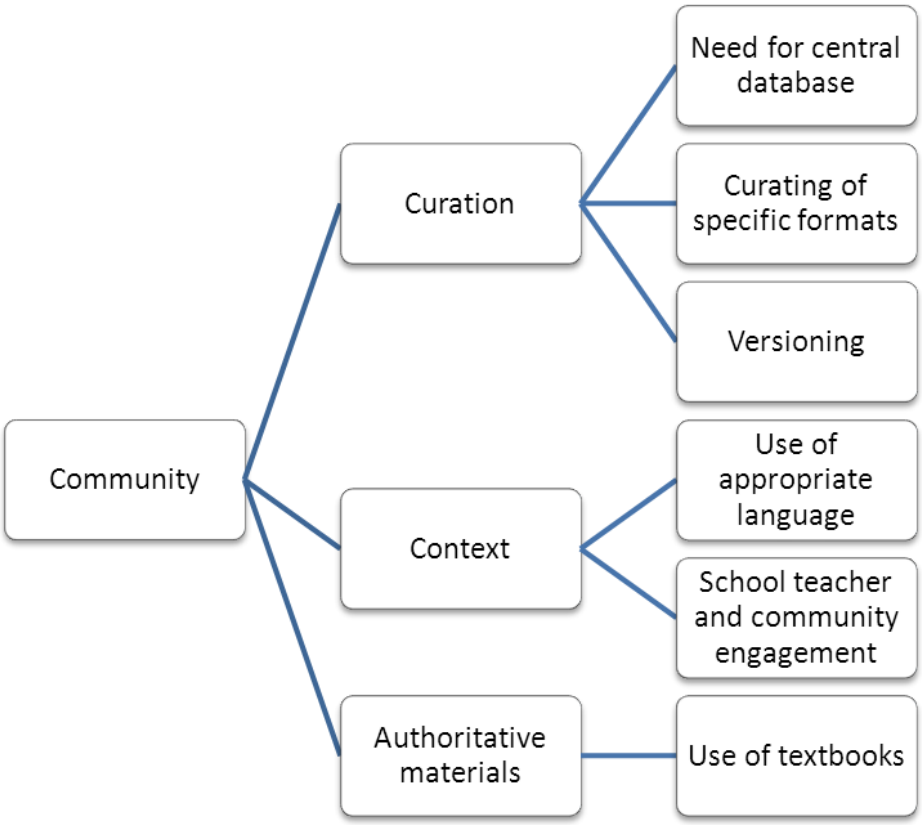

Figure 4.4 Summary of codes around community

4.2.2.1 Curation

The SHAWCO curriculum database of resources is still quite novel to most of the SHAWCO community. In this section I explore perceptions of how resources have traditionally been curated by the community and explore their recent experience with the new online system. Three sub-themes emerged around curation; the need for a centralized database; the curation of specific file formats; and versioning of documents.

4.2.2.1.1 Need for a central database

In order to ensure and promote continuity of the curriculum it was generally noted that the curriculum must be readily available to volunteers in electronic form so that they may refine and improve it. Generally respondents noted that historically materials were not very well curated. In some instances they had to be recreated from scratch on an annual basis. As one curriculum designer noted:

> *I don't know for how long this project has been running, but I basically had to construct a completely new curriculum. Because I only had last year's curriculum available to me, which […] wasn't done very well. Just because the person wasn't very committed, or there was issues around that. […] So I didn't have very many resources from previous curriculum to build on. But I don't understand where like the whole previous year's has gone.* (Interviewee 5, Curriculum coordinator)

Having materials stored centrally in Vula was noted by most to be the best way to increase access to the materials over the years. The strain of having to construct entirely new curriculum was an

experience this particular curriculum designer did not wish upon her successor, as noted in the following extract:

> *Maybe because there hasn't been this online thing yet to actually capture them properly and keep them somewhere. So now we are looking at a longer term resource, and definitely making this available to the next person who is going to use it. And hopefully they can build more on that, because I had basically nothing to go on in terms of previous curriculum.* (ibid.)

Both of the curriculum coordinators made reference to their desire for a "file system" of resources which could be readily accessed by volunteers as needed. In addition to the curation of resources, this would allow volunteers to query the database to find resources for specific purposes. One respondent noted that this could facilitate the finding of resources quickly, as illustrated in this passage:

> *They go onto Vula and say, ok teaching grade 5's, roughly this is what I am teaching about, and then they take something out, select it and modify it*. (Interviewee 4, Curriculum coordinator)

Curation implies not only the preservation of resources, but also keeping resources organised for future users. Advanced search and query engines play a crucial factor in facilitating reuse as they enable educators to get to specific resources quickly. It is too early to tell whether the curriculum database will be able to facilitate this need.

In assessing the curriculum database hosted on Vula, I was able to access all of the resources hosted for sharing and reuse among the various SHAWCO projects. At the time of analysis the resources section of the site hosted a total of 486 items which were shared and organised within 121 file directories. A summary of file types stored in the curriculum database is presented in Figure 4.5.

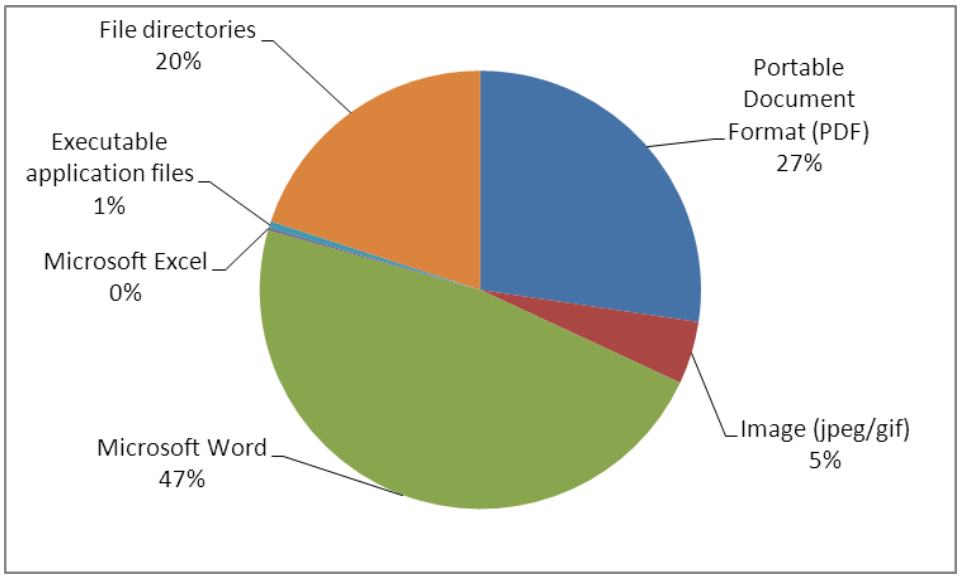

Figure 4.5 File types stored in the curriculum database

The dominant file type was Microsoft Word documents, with a total of 288 files on the site. There were additionally 166 PDF documents, 28 standalone image files, 3 executable application files and 1

Excel spreadsheet. The executable files were programs to compress files, convert PDF to Word or Word to PDF. All files were organised into 121 file directories in which the directory file name most typically detailed the project which they were being used for and the year in which they were applicable.

The resources section of the Vula site was fairly well organised and one could quickly access resources for a specific project. The only descriptive indicators of what the materials contained were the file name of the folder or document. Unfortunately, the Vula resources tool provides little in the way of descriptive metadata which could make resources more discoverable in the database.

4.2.2.1.2 Curating of specific formats

Often cited by respondents was the need to curate materials in formats which allowed others to adapt, rework or take specific elements from materials. Formats such as PDF which are secured and difficult to edit and were most often cited as a challenge to work with.

Respondents noted that most materials are designed and edited in Microsoft Word. Materials are then converted into PDF files as this is the format in which materials are generally sent for printing. Respondents noted that MS Word files were problematic as they are typically quite large and do not preserve formatting when viewed on other computers. As one respondent noted:

> *We design in word and the final we 'pdf'ify' it, when we have the final version that gets sent to printing. Because sometimes word displays your content incorrectly when you send it to another computer.* (Interviewee 2, Curriculum committee)

It then becomes crucial that both the MS Word and the PDF are curated together. If the MS Word file was lost or misplaced the PDF is a challenge to edit and therefore reuse. In a number of cases respondents noted that they had experienced instances when they only had a PDF version of materials they wanted to edit. In these cases they reported using file converting software found on the internet to convert PDF to MS Word files. Otherwise they used the PDF snapshot tool to extract pieces of the document or ended up recreating the material from scratch, as this extract illustrates:

> *Most of the resources that I found were in PDF format which is why I was downloading [software] to convert them into MS Word so I could use them […] it is difficult to then actually use them because you need to kind of convert them. What I was doing was converting them to images so it would keep the structure and then select the image and put it into a word document.* (Interviewee 5, Curriculum coordinator)

In a few instances respondents reflected upon how they dealt with hard copies of materials when they wanted to edit or share them in Vula. One respondent reflected on the process of scanning teachers' guides for reuse and sharing online:

> *What we had was the teacher's guide and we had to actually upload them in Vula, that was one of our biggest challenges cause when you scan it, it comes up in PDF. So then you couldn't reproduce the material and then extract the worksheets that were relevant to our activity. And in that sense we sort of thought, ok this was not useful and then we left it there.* (Interviewee 3, Project leader)

The scanned documents would have likely been presented as images in a PDF viewer, making it difficult to even extract text from within the document. Clearly the curation of editable formats is crucial to fostering the continuity of resources in the SHAWCO project. Editable formats also make it easier for people to adapt and rework materials thereby facilitating reuse. If materials cannot be scanned so that they are editable, it would be advantageous to save scanned worksheets separately so that they may easily be accessed and combined with other single page resources.

Within the Vula curriculum database most files were being stored in an editable document format. The PDF files were intended for print and were stored in directories indicating that they were 'final' versions for the indicated year. In many cases the PDF documents were not curated together in the same directory. As an observer it was difficult to tell where one could find the editable document of the 'final' version of the curriculum. It would be advantageous to have both of these files stored together with similar file names, so that the curriculum could be quickly reused and improved annually by newcomers.

4.2.2.1.3 Versioning

As documents are constantly getting reworked and adapted, the issue of maintaining the latest version of a curriculum document comes into question. Most respondents noted that versioning is handled within the projects as the curriculum gets generated. As one project leader noted:

> *In the process of developing you would have a half done curriculum, and then an almost done one and then a finished one. But in the end we just like the completed one to be used next year. So I think in the interim it can become confusing, if you don't manage the content properly with versions.* (Interviewee 1, Project leader)

With the curation of materials moving onto Vula, it becomes increasingly important that projects manage their versions carefully so that all stakeholders know which one is the master copy. It was noted by one respondent that "*there are so many folders and everybody has creative rights to do whatever they want … at the end of the day our curriculum was printed incorrectly because nobody knew which was the edited version*" (Interviewee 1, Project leader).

Users of the Vula curriculum database may benefit from having a site administrator who is responsible for managing the file system and keeping things orderly. This would help maintain consistent naming conventions for files in progress and ready for print.

Within the resources section of the Vula curriculum database, materials can only really be described with the file name or by organising them within a specific directory. In analysing the Vula database documents were usually named with the associated project title, the subject of the materials, in some instances the grade they were intended for, and the word 'volunteer' or 'learner' to indicate who the document was aimed at.

Members of the curriculum committee also noted some of the disarray of resources on the Vula site and the challenge of editing and uploading versions. As one curriculum committee member noted:

> *There is a problem with uploading resources, then editing it, then saving it again, cause then you have to save it as a new document … ideally what we wanted was a platform where we*

> *could upload things, and edit it, and then save it. Something like the Google Document thing*. (Interviewee 6, Curriculum committee)

I mentioned to one interviewee the 'Upload new version' feature in Vula which replaces the target file with a new version when uploading, but she was unaware of this functionality. Perhaps some advanced training on best practices with Vula would be helpful for the SHAWCO volunteers who are managing the database.

The curriculum committee is using the Vula forums and wiki to explore ways in which real-time collaborative editing can be implemented within Vula. Volunteers interested in curriculum are encouraged to add contributions to the discussion forums and wiki. It was noted that these tools are slightly difficult for non-technical users:

> *The problem is the user friendliness for certain tools, for example like the wiki, or the forums. I think sometimes they require you to use tags, almost like HTML coding, which is not really user friendly for the average developer. So it would be good if the user friendliness could be improved.* (Interviewee 2, Curriculum committee)

If the collaborative tools within Vula were simplified to be accessible to the most non-technical user, contributions to these discussions may increase. In the interim the curriculum committee has offered to help users who want to collaborate on resources with technical assistance and support.

Curation is being recognized as a significant process within SHAWCO especially as the curriculum committee has taken the lead in creating a system for resource sharing and storage. As these processes become more formalised and established, the curriculum database looks promising as a curation platform where resources can be selected and reused.

4.2.2.2 Context

Interviewees were quite clearly considerate of the context in which the projects operate. As each project is operating within a distinct community, specific considerations were raised around the language of instruction and the relationship with school teachers and community members. These issues were noted to have a direct impact on how materials get reused among the projects.

4.2.2.2.1 Use of appropriate language

The language of instruction is a major issue for SHAWCO volunteers as most learners in the SHAWCO projects do not have English as a first language. The learners' home languages also vary in each of the regions in which the projects operate, adding a further level of complexity. In the two projects upon which I focused in this study, the dominant home languages were Afrikaans and isiXhosa.

Many of the interviewees spoke of integrating some home language materials into their curriculum. It was generally noted that projects don't have the capacity to address many of the multilingual challenges within the community. Partnerships were being developed with the Project for the Study of Alternative Education in South Africa (PRAESA)[39] and the Vulindlela reading club, which develop curriculum materials and train teachers on multilingual education.

[39] http://www.praesa.org.za/

Interviewees noted that it was difficult to find materials in South African languages apart from textbooks. One respondent observed: *"It would help if the technology could also […] translate some information here and there to give them some home language"* (Interviewee 2, Curriculum committee). As translation websites such as Google Translate[40] are becoming more sophisticated they may gradually become more useful for this purpose.

The translation of materials into appropriate languages was deemed to be quite an important need within SHAWCO, as most materials found within the community were in English only. Fortunately there are South African institutions such as PRAESA who are creating material for multilingual learners. Hopefully some of these materials will be made available under open licences, thereby broadening access to multilingual teaching resources and helping to address this national challenge.

4.2.2.2.2 School teacher and community engagement

As SHAWCO projects are supporting learners also attending government schools, I sought to understand how SHAWCO and school teachers were working together. Four of the six interviewees noted a desire for greater school–teacher engagement. A number of problems were mentioned which had not yet been overcome, such as timing of meetings and a perceived general disinterest by teachers in working with SHAWCO. Time constraints for both volunteers and teachers were cited as the greatest barrier to collaboration.

In principle, school teachers were understood to want SHAWCO to provide the human resources for learners to do their homework. As one respondent noted: "*They would like us to have supervised sessions. Cause they obviously can't go home with the students and say, like you know, (laughs) did you understand what we did in class today?"* (Interviewee 1, Project leader). It was generally agreed that school teachers want SHAWCO to support the school's curriculum explicitly. One respondent noted:

> *That [governmental curriculum] information is available on the internet, like the Department of Education, especially the Western Cape Department of Education, has all of the [material] they have to do in different times. So that information is available. What happens is at schools, it is not really followed to the tee. So, it's flexible in that sense. Also textbooks generally follow it; the problem is that curriculum in South Africa is always changing, so next year it's going to be completely different.* (Interviewee 6, Curriculum committee)

It is a major challenge for SHAWCO to stay abreast of the changes in government curriculum in relation to their own curriculum processes. Respondents commonly noted that SHAWCO was trying to address what they perceive to be the needs of the community, rather than tracking and addressing the larger issues of schooling in South Africa.

4.2.2.3 Authoritative materials

One might envisage that students perceive textbooks as having more authority than online resources because in nearly all levels of formal schooling the textbook still prevails as a dominant medium. With many new educational materials emerging on the internet it's becoming increasingly important to explore how educators perceive their value and use them in practice.

[40] http://translate.google.com/

The perceptions and use of textbooks in SHAWCO differed greatly by project and by individual. One of the projects had purchased a set of South African textbooks which were the primary source of educational material for that project. These textbooks provided the main source of lesson ideas and worksheets. The textbooks were perceived to be working well as one respondent noted: "… *so basically everything is in hard copy and has been prepared for us already*" (Interviewee 3, Project leader).

Other interviewees noted that textbooks were more trustworthy as it was possible to see more information about the materials than in an online resource. As this respondent remarked: "*I know how to check the dates, the publisher. Maybe the date to just see how current it is, and then whether it's got any affiliations to [an] education board*" (Interviewee 4, Curriculum coordinator). This interviewee further commented that with: "… *online, it's difficult, especially the way I was accessing curriculum, you just get the worksheets that pop up*" (ibid.).

By contrast another interviewee, also in the curriculum coordinator role, noted that: "*Yeah, I would think a textbook is more authoritative, which is precisely the reason that I didn't want to use any*" (Interviewee 5, Curriculum coordinator). The interviewee went on to explain:

> *Because we are going out as a supplement to the school, we didn't want to be the people the schools are. The schools want to use the textbooks and we wanted to [...] also sort of get more interactive resources which I think you can find more online, than in textbook. Which especially aren't really adapted to the context in which we are teaching.* (Interviewee 5, Curriculum coordinator)

Here the respondent notes that textbooks are too formal for the environment within which the project operates and that they endeavour to find more interactive resources online. Interviewees also noted that it was often quicker to create curriculum materials from online resources. One respondent commented that when creating materials from texts you have to first "*go and get the book, whereas you are in front of your computer, you are writing stuff up. Going online is just a lot easier*" (Interviewee 6, Curriculum committee).

Respondents provided varied responses to how they appraise materials to be authoritative or trustworthy. While some saw the textbook as authoritative, in the sense that it provided information on the publisher, date and place of origin, allowing educators to scrutinise material, others saw textbooks as too formal for use in this setting. One respondent summed up the strategy for dealing with materials selection quite well, as explained in this extract: "*It's not really that its authoritative, it's more that it is appropriate*" (Interviewee 6, Curriculum committee). This statement demonstrates that the respondent was less concerned about the format and was actually assessing the suitability of the materials. In an age where so much content is available online, evaluating online resources is becoming an important new literacy.

4.2.2.4 Summary

The interviews allowed me to explore ways in which the community influenced SHAWCO activities by facilitating or hindering the reuse of materials. The need for active curation of materials by the community emerged as the most significant factor to support reuse. Additionally, the importance of engaging with the community in an appropriate language emerged as a significant issue, as materials

in local South African languages are not always available as OER. Furthermore, the way in which SHAWCO engaged with teachers and community leaders emerged as a relevant factor in how materials are accessed and reused. The next section will explore the third subsidiary question of how roles and responsibilities factor into materials reuse.

4.2.3 How do roles and responsibilities enable or inhibit reuse?

This section explores themes which emerged around how the roles and responsibilities are defined within this system of activity and specifically how the division of labour factors into the reuse of materials. Specific themes which emerged here were the collaborative nature of curriculum design and students' willingness to use materials from other social outreach organisations.

Table 4.3 presents a summary of the frequency of codes applied to each interviewee's response with a summary of the total codes applied for each broad theme.

Table 4.3 Frequency of coded passages for division of labour

	Collaborative creation of curriculum	Willing to share and reuse materials from other social organisations
INT1	14	2
INT2	3	2
INT3	5	1
INT4	5	1
INT5	8	1
INT6	9	1
	44	**8**

As can be seen in Table 4.3, considerations around the collaborative creation of curriculum materials was the dominant issue in relation to division of labour. Figure 4.6 displays a summary of the coding scheme and sub-codes related to division of labour. The sub-codes which emerged in this category include: challenges around collaboration; logistical issues around collaboration; volunteers' knowledge of the subject matter and ability to scrutinise resources; volunteer turnover; willingness to use materials not developed within SHAWCO.

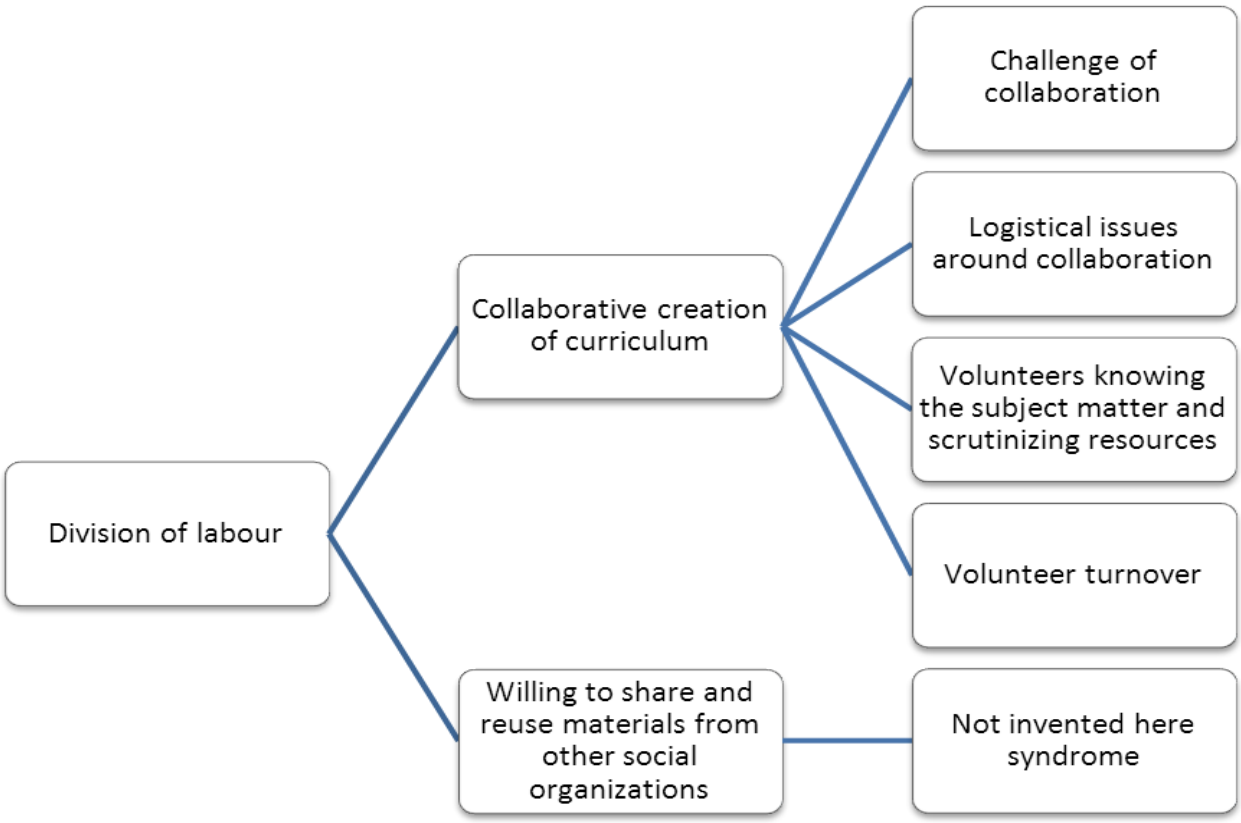

Figure 4.6 Summary of codes around division of labour

4.2.3.1 Collaborative creation of curriculum

As the SHAWCO curriculum is collaboratively created among curriculum coordinators, curriculum committee members and volunteers, a variety of challenges arise in managing this process. Four themes emerged in this category including: challenges around collaboration; logistical issues around collaboration; volunteers' knowledge of the subject matter; and ability to scrutinise resources and volunteer turnover.

4.2.3.1.1 Challenge of collaboration

An understanding of who is responsible for what, in terms of roles and responsibilities in a voluntary organisation such as SHAWCO, is potentially a challenge as people are donating their time. As the curriculum committee is still quite new, there were some contradictions in the volunteers' understanding of who was responsible for creating the finished curriculum. One project leader noted some confusion around roles, as illustrated in the following passage:

> *There has been a lot of misunderstanding in terms of the roles. Because we have a central curriculum committee and I have a representative in my project – so it's always – we're not sure who is supposed to be reproducing the materials.* (Interviewee 3, Project leader)

It was noted by volunteers outside of the curriculum committee that they were unsure of exactly what the curriculum committee would be responsible for. One of the curriculum designers had particularly high hopes for a central database or resources, as illustrated in this extract:

> *I was sort of thinking that would mean we would actually have a database where they would gather you know from different organization, or from different schools, or whatever, they would actually gather resources that I then I could sort of pick out what I wanted. But that didn't really happen.* (Interviewee 5, Curriculum coordinator)

The curriculum committee has begun to build a central database of resources using Vula. However some of the challenges around finding resources in Vula still prevail, as illustrated in the earlier discussion around curation. Some of the challenges around roles and responsibilities are likely to diminish as the SHAWCO curriculum committee becomes more established. Thoughtful communication among the projects and the committee will be an essential part of mitigating further confusion.

4.2.3.1.2 Logistical issues around collaboration

As earlier noted in Section 4.2.1.2, which explored the evaluation of materials, increased contributions towards improving the curriculum from volunteers in the field was desired by curriculum stakeholders. However, capturing these contributions towards improving the curriculum from the field continues to be a challenge. As one respondent noted: "… *volunteers need to have that same sort of passion or buy-in to want to develop the curriculum further"* (Interviewee 1, Project leader).

As expected in a volunteer organisation, the amount of time that everyone is able or willing to give is variable. Volunteers have to balance the many other obligations they have committed to their own studies, family and social life. Balancing commitments was often cited as an issue within the projects.

Specifically the academic holidays posed a problem for curriculum development. During the holiday students may go off campus, take up employment, or undertake field research.

> *The curriculum person from [our] project didn't have a lot of internet access over the holidays. Which kind of made it impossible all of a sudden to communicate with her and actually like share the work we were meant to be doing […] So now, because we are still at varsity thinking about next curriculum it is much easier to work with each other and share the work between us.* (Interviewee 5, Curriculum coordinator)

During the break students may not be assured of having all of the facilities and services campus offers them during the term. So access to the internet can vary during the break, depending on where the volunteer is situated.

4.2.3.1.3 Volunteers knowing the subject matter and scrutinising resources

Interviewees commonly mentioned the importance of selecting and designing curriculum materials which were easy for volunteers to use.

> *A lot of it is making the resource easy for volunteers to understand, use and explain. Because you would be surprised at how difficult content is to explain, even if it is simple content. Teaching something and understanding it is different.* (Interviewee 6, Curriculum committee)

Evidently finding materials to use which simplify the teaching of concepts is ideally what curriculum developers seek. Curriculum developers noted that they also add their own knowledge on the subject whenever possible. Having a solid understanding of the content is essential to adding some value to the resource as one respondent noted: "*I think it's important to have an understanding of the material, so that you can write your own comments and instructions"* (Interviewee 2, Curriculum committee).

4.2.3.1.4 Volunteer turnover

In a volunteer organisation where the main source of support is only available for an average of four years, turnover is a major issue. The continuity of volunteers may not be relied upon, and so the continuity of the curriculum and well documented processes is imperative. The six interviewees whose perceptions I have explored in this study will someday soon leave SHAWCO.

As discussed in section 4.2.1.5 on volunteers' autonomy, new leadership often wants to transform projects according to their own goals and ambitions. As the longest serving interviewee in this sample notes:

> *People want to come in and put their own stamp on it, and make it really good, and we have all this enthusiasm at the beginning, but then the actual implementation of making those changes is really difficult […] in most cases people try and do something different, and that's not always a good thing.* (Interviewee 6, Curriculum committee)

The issue of turnover poses a genuine challenge to the development and maintenance of relevant and current curriculum materials within SHAWCO. So, preservation and curation of the good practices and materials available to the projects must be maintained.

4.2.3.2 Willingness to use materials from other social outreach programmes

All respondents expressed a willingness to share and reuse materials from other social organisations at UCT. I asked specifically about Ubunye and TeachOut, two organisations also involved in teaching in the Cape Town community. Respondents noted an interest in sharing materials across the different outreach programmes operating from UCT. Several respondents commented that they were surprised that there was not yet more collaboration among the organisations.

A number of respondents noted that they would like to see the various social outreach organisations pool their resources using something like Vula. One respondent noted that it would be quite beneficial if "*all of us could be on one platform, but still maintain our own, like the way we do things*" (Interviewee 2, Curriculum committee). Another respondent further commented that "*we are not competing for the same resources, we actually looking for the most optimal that is free for us to use*" (Interviewee 1, Project leader). Respondents were quite positive about the possibility of both collaboration and resource sharing with organisations which have similar intentions.

4.2.3.3 Summary

The interviews allowed me to investigate ways in which the roles and responsibilities have impacted upon SHAWCO activities. Defining roles and responsibilities in an environment challenged by high turnover and competing priorities is the greatest challenge in supporting the reuse of materials in

this category. In the following section I will explore the final subsidiary research question around how technology is affecting the reuse of materials.

4.2.4 How does technology enable or inhibit reuse?

This section explores how SHAWCO is embracing technology for curriculum development. I specifically examine how technology is helping to facilitate reuse of materials and what challenges the volunteers face in terms of harnessing technology to foster reuse. Table 4.4 presents a brief summary of the frequency of codes applied to each interviewee's response, with a summary of the total codes applied for each broad theme.

Table 4.4 Frequency of coded passages in relation to technology

	Technology facilitating reuse	Challenges of using open content
INT1	5	6
INT2	11	3
INT3	9	-
INT4	9	-
INT5	13	3
INT6	15	1
	62	**13**

Table 4.4 clearly shows that volunteers were generally quite positive about how technology was enabling the reuse of materials within SHAWCO. Technology was frequently mentioned as a key aspect which was facilitating materials reuse. Figure 4.7 displays a summary of the coding scheme and sub-codes related to technology. The sub-codes which emerged in this category include: how technology is enabling the reuse of materials; challenges in dealing with vastness of the internet; various file formats; and the accessibility of technology resources.

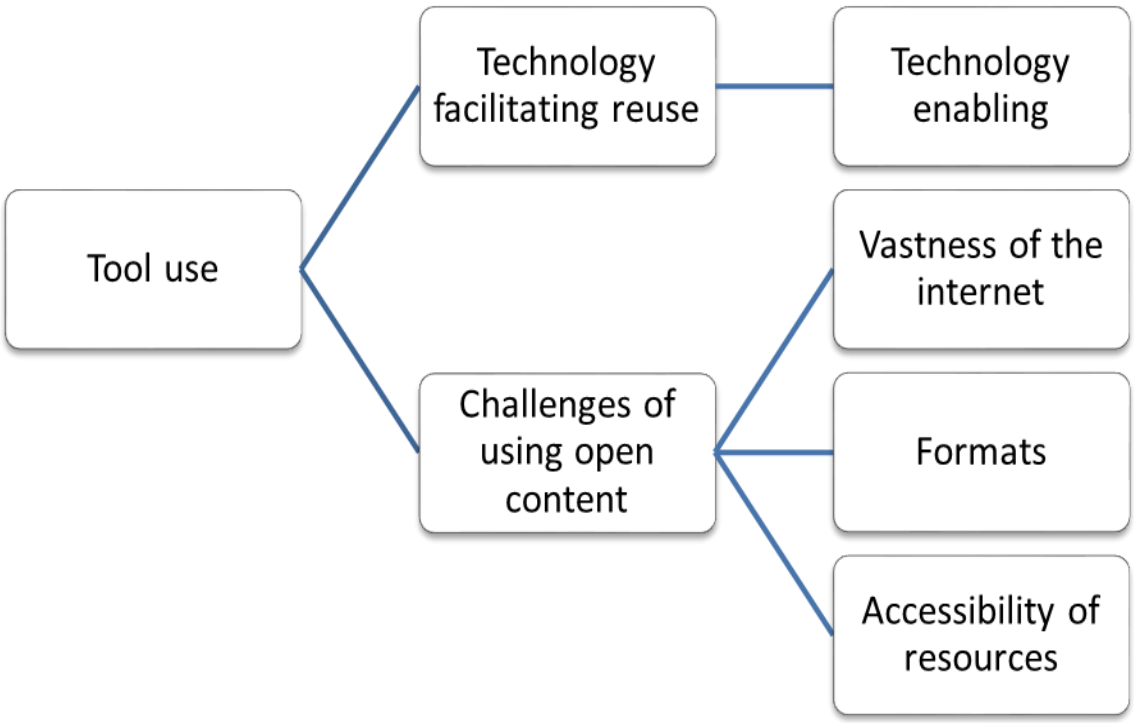

Figure 4.7 Summary of codes around technology

4.2.4.1 Technology facilitating reuse

Vula specifically was singled out by most volunteers as providing an adequate medium to share and discuss curriculum development. The greatest advantage highlighted by respondents was that it was familiar to all UCT students and that everyone has access. As one curriculum committee member noted: "*… students are already familiar with [Vula]. So it's not a technology that we have to train them for because their courses already use it*" (Interviewee 2, Curriculum committee).

Some respondents suggested that Vula would help ease many of the logistical issues around volunteer turnover and the curation of curriculum. Historically many of these handover processes were not done in a systemised manner, as one respondent noted:

> *Usually that [curriculum] gets individually given in soft copy to the different people, what we have done this year is put it on Vula. So everybody has access to it on Vula. What we hope was that, people from different projects, because often they do the same things but in different areas, would use each other's information and take the best of all of the different curriculum.* (Interviewee 6, Curriculum committee)

Once resources are uploaded into Vula they are available to all volunteers on the site. As new volunteers come aboard they can simply be added to the site and view and access all of the existing content. The excerpt above illustrates the respondents' aspirations that the transparency and openness of this method will facilitate improved quality in the curriculum overall.

The significance of social networking tools such as Facebook and BlackBerry Messenger (BBM) emerged as a less identifiable yet crucial factor for collaboration, communication and networking. One respondent revealed they use communication tools on their cellular phone such as "*BBM or*

WhatsApp to communicate" (Interviewee 5, Curriculum coordinator). While students did not directly refer to these communication tools specifically in relation to curriculum development, I noted that they were frequently mentioned almost ubiquitously. One respondent revealed: "… *it makes it easy, in terms of coordination when everyone is on your [Facebook] page"* (Interviewee 3, Project leader). Because so many of the volunteers are also on Facebook, it appears to be used quite frequently for informal communication and scheduling meetings and deadlines.

Interestingly one respondent suggested that it is quite easy to take technologies into the field to aid teaching. She reflected upon how she had seen technology engaging the learners in the field in the following passage:

> *I went out yesterday and one of my volunteers had his iPad with him. At the end of the lesson he was actually playing games with the kids on the iPad, playing concentration or whatever. It was so much simpler than actually getting the stuff there, then needing to unpack it and repack it, and sort it, and like keep it in order.* (Interviewee 5, Curriculum coordinator)

The respondent reflects on how time and effort to bring the physical raw materials into the field could be alleviated if tablet computers like the iPad were used for teaching. Naturally teaching with tablet computers comes with many other considerations, but it is interesting to note how volunteers are starting to consider novel technologies as potential tools for teaching.

4.2.4.2 Challenges of using open content

Despite the wealth of freely available educational content now online, educators still face challenges in appropriating and making use of online resources. This section explores the specific challenges that SHAWCO volunteers have faced in understanding and using openly available content found on the internet. The three sub-themes which emerged here were: the vastness of the internet; online file formats; and the accessibility of resources.

4.2.4.2.1 Vastness of the internet

Four of the six respondents revealed that it was challenging to source materials on the internet due to the overwhelming amount of content available. Locating and assessing quality and relevant materials online takes a great deal of time and effort and respondents lamented that even after finding resources of use online there was always a chance of finding something even better, given more time and effort, as is illustrated in this extract:

> *If you haven't found the perfect thing it might mean the perfect thing is out there somewhere! So you keep searching and like it just takes so much time, to search for the perfect lesson which might come sometime but never does.* (Interviewee 5, Curriculum coordinator)

As previously discussed, the interviewees had not found an all-encompassing website from which to source materials, so many explorations began with a generic search engine. Since this activity would bring up a wealth of results, respondents admitted that it was often difficult to identify good resources. When examining search results one respondent acknowledged that "*there are too many things and you don't know where to go"* (Interviewee 1, Project leader). Another respondent added

that "*part of the problem is you need to look at so many things to find one or two ideas you could use in your project*" (Interviewee 5, Curriculum coordinator).

The amount of information available via the internet is staggering. Assessing and curating good resources is becoming an important skill in the information age. One respondent added: "*… the problem [is] being over-resourced. Like having too much information, and the big thing that I would really like, you were saying curatorship […] narrow down the best"* (Interviewee 6, Curriculum committee). Although websites that curate teaching materials have begun to surface, no one comprehensive solution to the challenge of finding and organising teaching materials online has yet emerged.

Communities of practitioners increasingly need to find ways to curate resources they deem useful for their activities. The SHAWCO curriculum committee appears to be trying to use Vula for the sharing and curation of relevant materials in its education projects. It will be interesting to see how the Vula curation system develops as it becomes more established.

4.2.4.2.2 Online file formats

One respondent remarked that many of the websites which contain rich educational resources require that the learners be at a computer working with the materials. These resources are electronic learning (e-learning) materials and not resources intended to be printed out and taken into the classroom. There was a desire to perhaps use some of the ideas from these materials in classroom-based activities. One respondent acknowledges that, many of these electronic learning resources appeared useful, but she reveals:

> *I have no idea how I would adapt something like that into a [lesson]. Plus it would take even more internet cap, and more time for me to personally go through the game and do all the steps, to actually see what it's doing.* (Interviewee 5, Curriculum coordinator)

It might be useful if the learning activities embedded within electronic learning materials were made more explicit for use in contexts without access to computers. Trying to reverse-engineer e-learning materials for classroom use could be a time consuming and costly exercise. Resources should ideally be tagged for use in classroom-based activities explicitly so that educators could search for these resources specifically.

4.2.4.2.3 Accessibility of resources

The arrival of the SEACOM (2009) fibre optic cable in South Africa and the development of a more established domestic network has had a positive impact on bandwidth and e-infrastructure for higher education, but bandwidth remains limited and costly relative to many other countries.

Students at UCT are allocated a limited amount of bandwidth for use each month. In July 2011 the student internet quota was raised to 3 gigabytes per month for each UCT student[41]. This is a significant increase from the 200 megabytes students once had available to them, but for many SHAWCO volunteers searching for resources used up a significant portion of their bandwidth quota, particularly if their only access to the internet was on campus. One respondent complained that

[41] http://www.icts.uct.ac.za/modules.php?name=News&file=article&sid=1698

finding curriculum materials for his/her projects was in fact "*using up all of my internet cap"* (Interviewee 5, Curriculum coordinator).

It would be beneficial to provide SHAWCO students with a greater internet quota than regular UCT students as a great deal of their internet time is spent searching for materials to be used in social outreach programmes. Since this activity lends itself to UCT's social responsiveness agenda, students should be free to explore resources to enhance the programme without this making a negative impact on their personal bandwidth quota. Increased bandwidth would give students more freedom to search and discover materials for use in social outreach programmes.

4.2.4.3 Summary

In this section I have explored how technology is facilitating reuse within SHAWCO and outlined a few of the specific challenges experienced by volunteers in sourcing curriculum materials online. In the next section I will explore an aggregate view of the data and compare the data across the identifiable roles in my sample. I will then attempt to unpack the main tensions which emerged in this study using the concept of contradictions in activity theory.

4.3 Aggregate view of the data

In the previous section I explored the data according to the various themes which emerged from the literature review and the case study. In this section I take a broader look at the data as a whole. Another way to examine the data on aggregate is to look at the way in which codes were applied based on the interviewee's role in SHAWCO. The interviewees from this study were located in one of three distinct roles in their engagement with SHAWCO, either as: project leader; curriculum committee member; or curriculum designer. Figure 4.8 shows how data were interpreted according to individual's roles within the organisation.

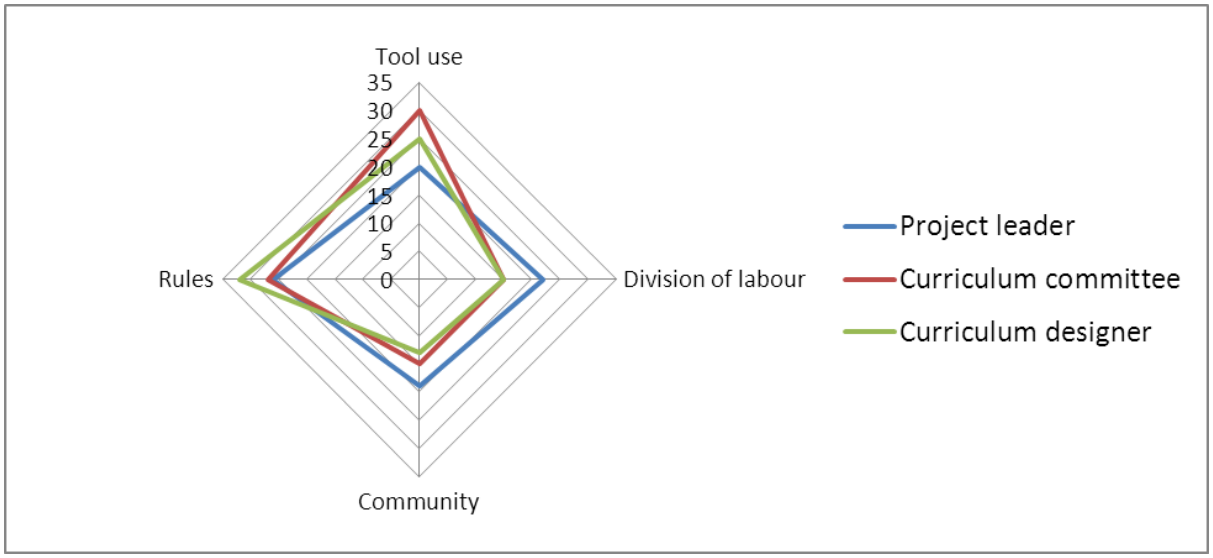

Figure 4.8 Frequency of coded passages organised by role

Figure 4.8 indicates that curriculum committee discourse centred on how tools can be used for the reuse of materials. Presumably this points to the fact that they are trying to encourage the use of various tools to construct and curate the curriculum. By contrast, the project leader role speaks

more frequently about issues of dividing up labour, indicating that they might be more concerned with how things get done in terms of roles and responsibilities. The final outlier that can be identified is the curriculum designer role in which issues around the rules governing their activity seemed to prevail. Despite operating within a shared activity system, the different priorities of the interviewees seemed to centre on distinct operational factors. This is to be expected in an organisation with a shared motive, yet with different roles and responsibilities within the activity system.

4.3.1 Text frequency analysis

Another way to look at the interview text involves comparing the frequency of words spoken in the interviews by people with different roles. I expect the word frequencies to be different by role and this should be independent of the coding schema I imposed upon the data. Word clouds are widely used to visualise the frequency of words appearing in a text. I have applied a technique proposed by Drew Conway for creating more informative word clouds[42]. Conway's approach allows us to more easily compare word clouds from two pieces of text.

This technique involves identifying the words used in both texts and then creating a term frequency index. Grammatical words (e.g., 'the', 'is', 'and') and stop words (e.g., 'laughs') are removed from the analysis. Words that are used most frequently are presented in a larger font. Words used more frequently by people with one or the other role, are placed towards either ends of the x-axis. Words said equally as often among the two bodies of text appear in the centre organised in descending alphabetical order. The distance from the centre of the graph conveys the words which were used more often by either party than any other words, which is why the words said equally do not always appear in the middle of the x-axis.

Using this technique, I can compare all of the words uttered by interviewees in a certain role against another role. The visualisations were created by taking all of the interviewee texts and pairwise comparing these among the three roles. The interviewer's text has been removed from the analysis.

In Figure 4.9 I contrast the frequency of words used by curriculum committee members to project leaders. The interview texts were very similar in length, although, as can be seen, the curriculum committee text is longer. One can see that the curriculum committee use the word 'people' disproportionally more than project leaders did, while conversely the project leaders use the word 'project' (singular) more frequently. This is an interesting perspective on how different roles communicate their perspective. The word 'curriculum' also dominates the visualisation. The word 'curriculum' was used frequently by both parties, although slightly more by the curriculum committee.

[42] http://www.drewconway.com/zia/?p=2624

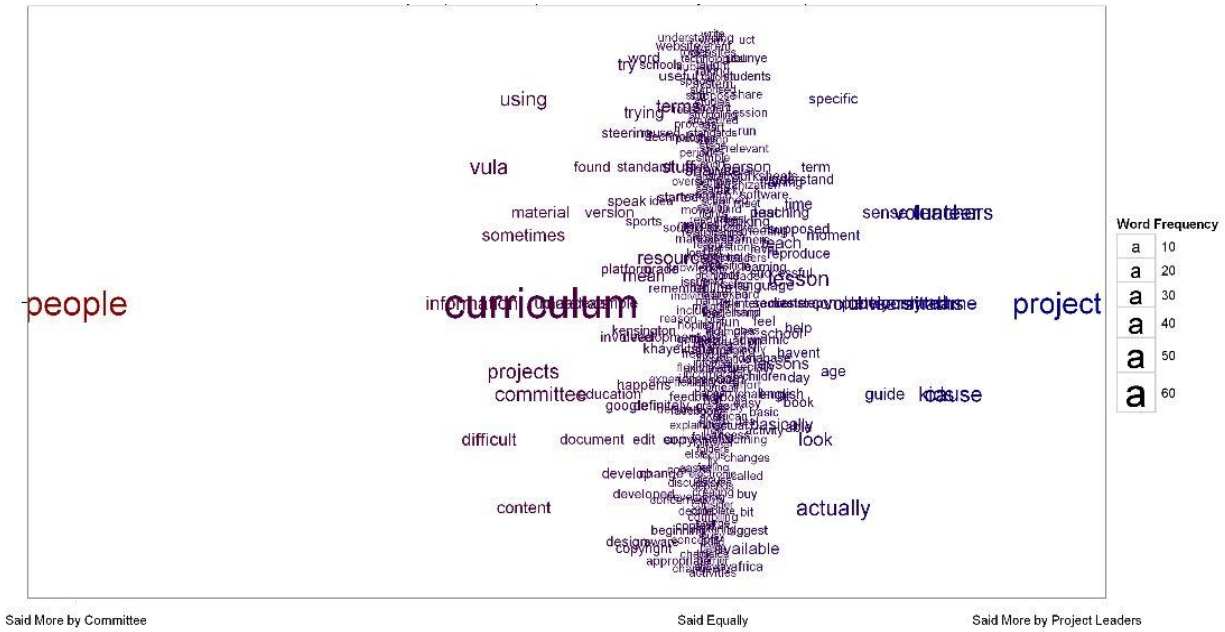

Figure 4.9 Comparing words from curriculum committee versus project leaders

In Figure 4.9 one can see that curriculum committee members referred mostly to 'people' when framing their discussion, indicating that they were speaking mostly about individuals. Conversely, project leaders framed their discussion around the projects themselves. Interestingly, curriculum committee members also spoke more often about 'content', 'materials' and 'Vula', which exemplifies their interest in curriculum materials and the curriculum database. The primary actions which curriculum committee members speak about are mostly about how content and curriculum materials are made accessible to the projects.

In Figure 4.10 I compare the word clouds of curriculum coordinators to curriculum committee members. Again the curriculum committee speaks most about 'people' while the curriculum coordinators make much more frequent reference to 'teaching', 'volunteers', 'games' and 'resources'. Once more the word curriculum is used frequently and almost evenly between the two roles.

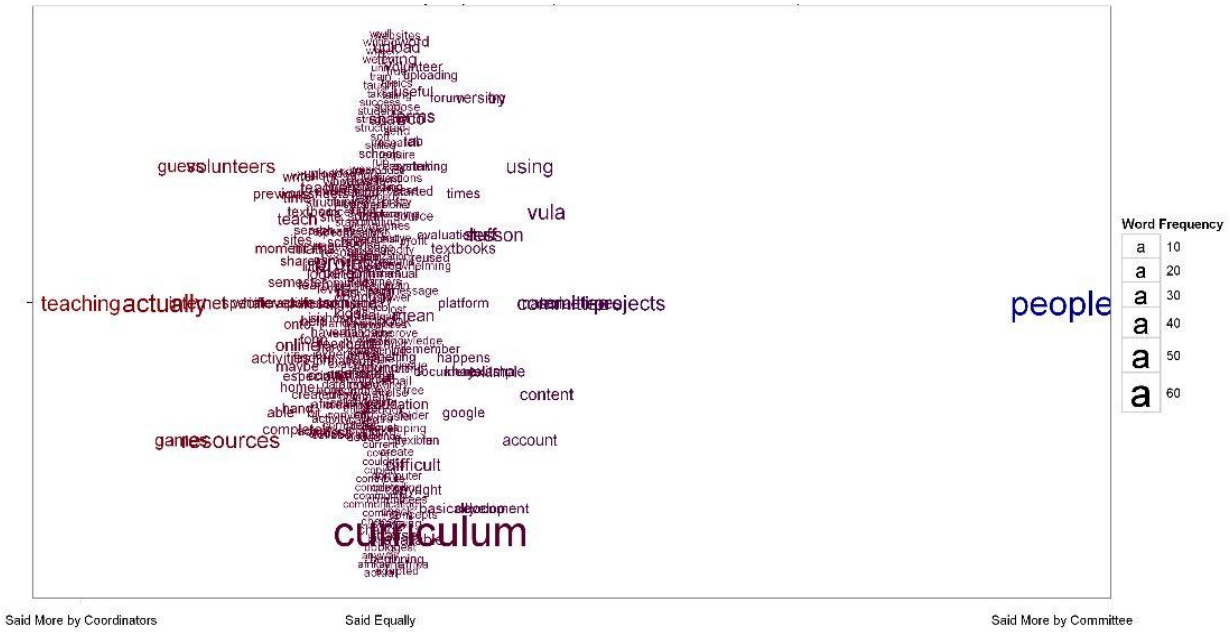

Figure 4.10 Comparing words from curriculum coordinators versus curriculum committee members

Curriculum coordinators predominantly mention specific resources, such as games which may serve as useful resources in the curriculum. The curriculum committee refers less to specific types of curriculum materials and makes reference to 'content' and 'Vula' more often. This exemplifies the curriculum committee's primary interest in sharing and curating content while the curriculum coordinators are more concerned with specific useful types of content for use in the curriculum.

Finally in Figure 4.11, I compare the word clouds of the curriculum coordinators and project leaders. Here word frequencies differ between the roles more than in earlier comparisons, as can be seen by more words being distributed across the x-axis. Curriculum coordinators frequently made reference to 'teaching' and 'resources', as seen earlier, but one can also see words such as 'internet' and 'difficult' emerge in this comparison. This visualisation also shows the words used disproportionally more often by project leaders including 'project', 'volunteer', 'teachers', 'lesson' and 'kids'.

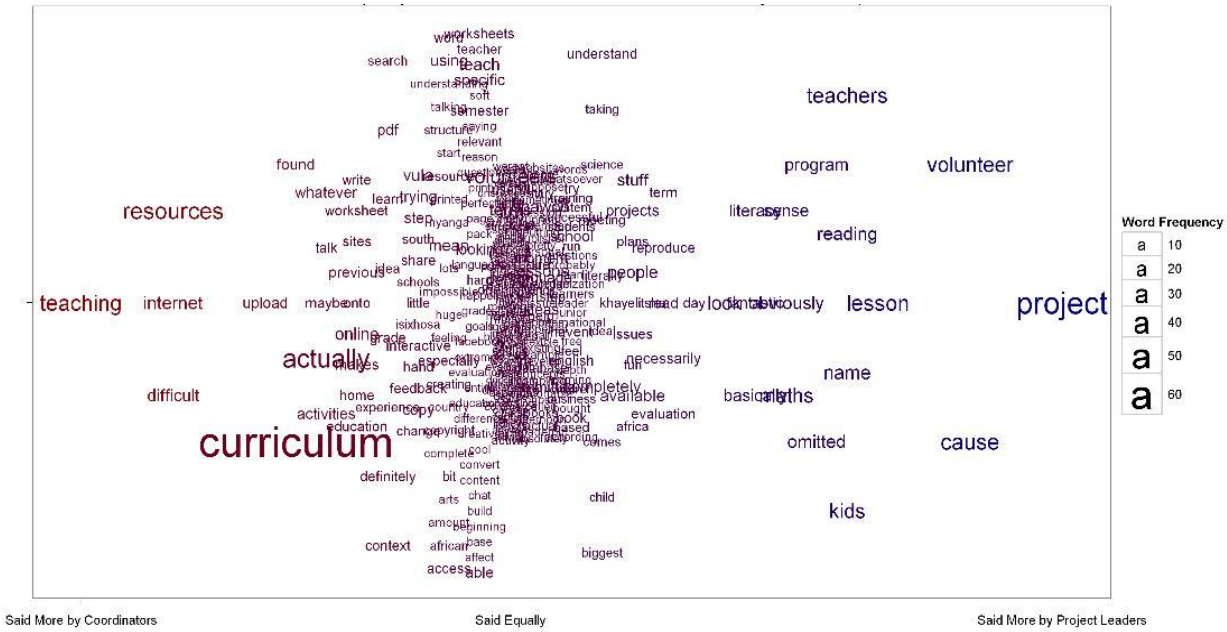

Figure 4.11 Comparing words from curriculum coordinators versus project leaders

Project leaders most often mention ‘lessons’, ‘readings’, ‘worksheet‘ and ‘programme’ while curriculum committee members speak about ‘resources’, ‘internet’ and ‘uploading’. This illustrates that curriculum coordinators spoke more often about managing individual and specific curriculum materials. Conversely, project leaders seem to more frequently mention the finished product, for example the lesson or programme.

Conway’s technique to compare two word clouds has provided another useful lens in which to view this qualitative data as a whole, and to explore the language people use to describe their activity. By and large the textual analysis supported the coding schema previously applied to the data as well as my own interpretation of the data as a whole. The word clouds provided a useful lens with which to compare bodies of text from interviewees of various roles by highlighting and accenting different priorities. The analysis also provided a view to how interviewees in specific roles frame the discussion and use specific language to describe their situation.

This difference in discourse reflected in the above analysis may in fact reveal the different ways in which people in different roles achieve the object of their activity. While as a whole SHAWCO’s object is to help improve the quality of life for individuals in developing communities, there are a variety of actions and operations which volunteers carry out in pursuit of that goal. It is in working together and combining their efforts that SHAWCO ultimately can make a difference in the community. In the following section I will explore some of the tensions which exist as volunteers pursue the object. I will also try to investigate how these tensions may lead to innovation and expansive developmental transformations (Engeström, 2000).

4.4 Identifying tensions in the system

In this section I will explore the main tensions which exist within the SHAWCO curriculum activity system. Having already framed the discussion of the data around Engeström's (1987) activity system, I will use the concept of contradictions to approach these tensions. A contradiction can reflect a tension, contrast, denial or opposition within the system of activity. Contradictions are not necessarily negative and can lead to innovation, change and developmental transformations (Engeström, 2000). So what I am exploring here is how new tools and practices are emerging and changing the system of activity.

Returning to the main research questions, I will now discuss the tensions in relation to the each research question, as illustrated in Figure 4.12.

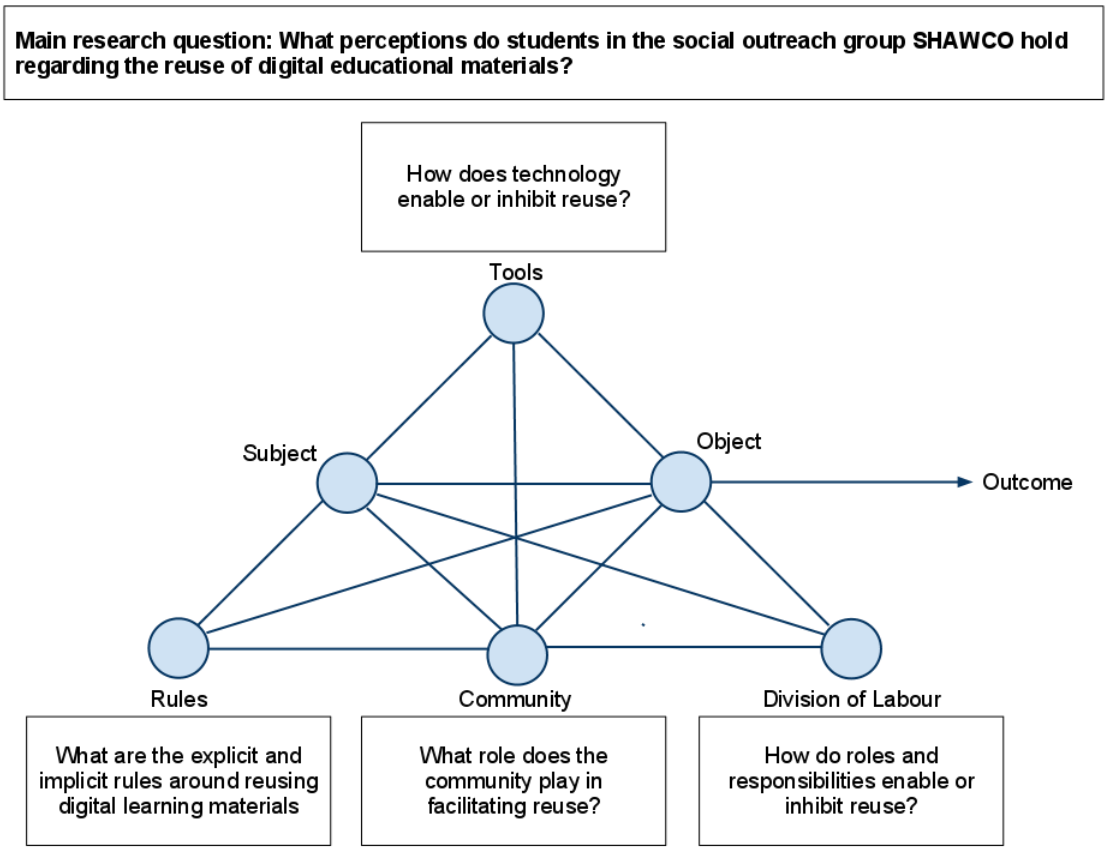

Figure 4.12 Research questions and theoretical framework

4.4.1 What are the explicit and implicit rules around reusing digital learning materials?

SHAWCO volunteers are encouraged to reuse and share educational resources among the various programmes. There is a fairly substantial learning curve associated with creating educational content from scratch and reusing materials which have worked in the past can help to ensure the continuity and quality of the programmes. As previously discussed, some volunteers are not entirely clear of the rules of engagement when dealing with content created by their colleagues. A tension seems to emerge between the tools and rules, as subjects are not sure how they can appropriate materials which they have not created themselves. Specifically students interacting with the

SHAWCO curriculum database are not entirely clear of the rules when reusing other volunteers' materials.

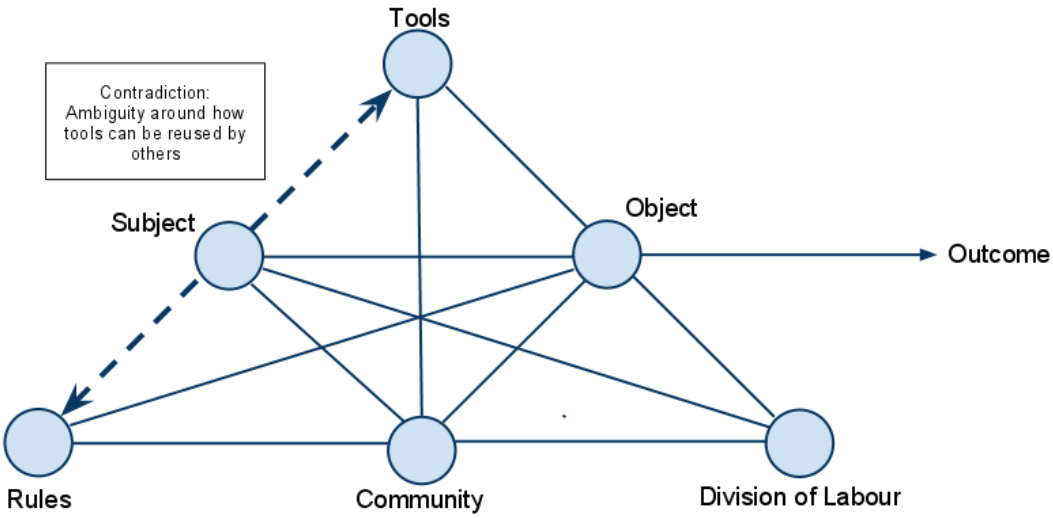

Figure 4.13 Tension between rules, subject and tools

More explicit rules around copyright and intellectual property within SHAWCO could help to alleviate this ambiguity around reusing other people's content. The use of licenses such as Creative Commons which encourage reuse while stipulating very clear and simple conditions may be useful to apply to all SHAWCO educational materials.

Additionally, volunteers desire more rigid systems for the evaluation of materials. As volunteers are not trained educators or learning designers, they feel the need for expert sign-off on materials which are being used in the community. Here the tension lies between the rules and the object of the activity system (Figure 4.14). The volunteers feel that they need to have materials approved in order for them to be satisfying the object of their activity.

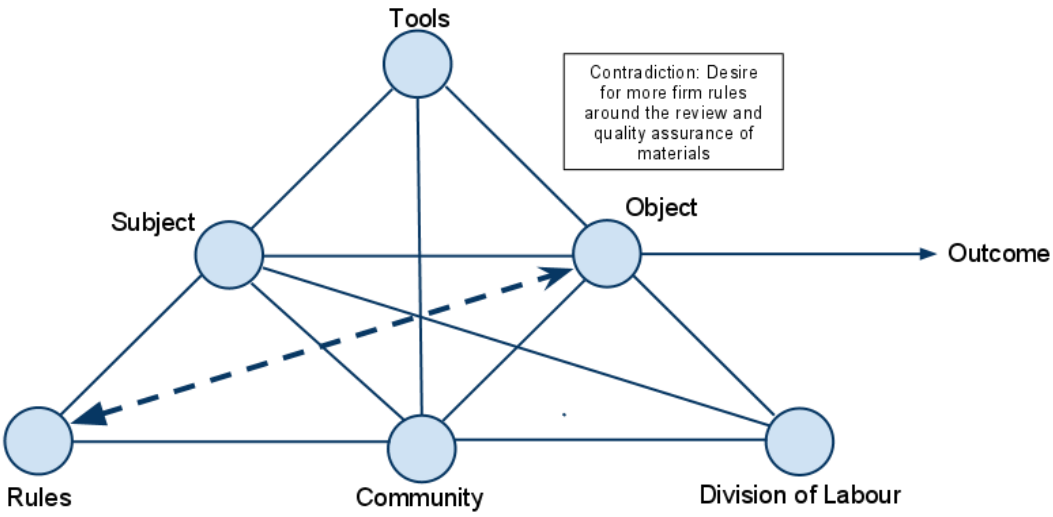

Figure 4.14 Tension between rules and object

In summary, it appears that ambiguity around some of the rules for volunteers in reusing others' materials is causing some tension in the system. This ambiguity may in fact lead to good materials not being reused optimally as students are unsure of how to properly attribute the original creators. Furthermore, volunteers desire more explicit rules around how materials are evaluated and quality assured. This has led to some projects consulting external organisations, as illustrated in the example where PRAESA was helping one of the projects with multilingualism. These types of partnerships could benefit SHAWCO as a whole rather than being project specific.

4.4.2 What role does the community play in facilitating reuse?

While the curriculum database is still quite new, it should help to provide a centralised location for the curation of materials. A number of volunteers expressed a concern that in the past it was difficult to find materials from previous years for use. In a number of cases materials appear to have been created from scratch as the new year began either because the materials were not available, or the materials were of poor quality, or the motivation behind the selection of material in previous years was not explicitly documented.

The curriculum committee has been formed in order to improve the sense of community for curriculum stakeholders. This has been done by gathering curriculum stakeholders and holding discussions and workshops as well as through the creation of the curriculum database and associated collaboration tools. Despite this, there appears to be a tension between the subject and community especially for new members of SHAWCO (Figure 4.15). A number of interviewees noted that when they first joined the programme it felt chaotic and confusing, and it took a number of years to acclimatise to how things work in the SHAWCO organisation.

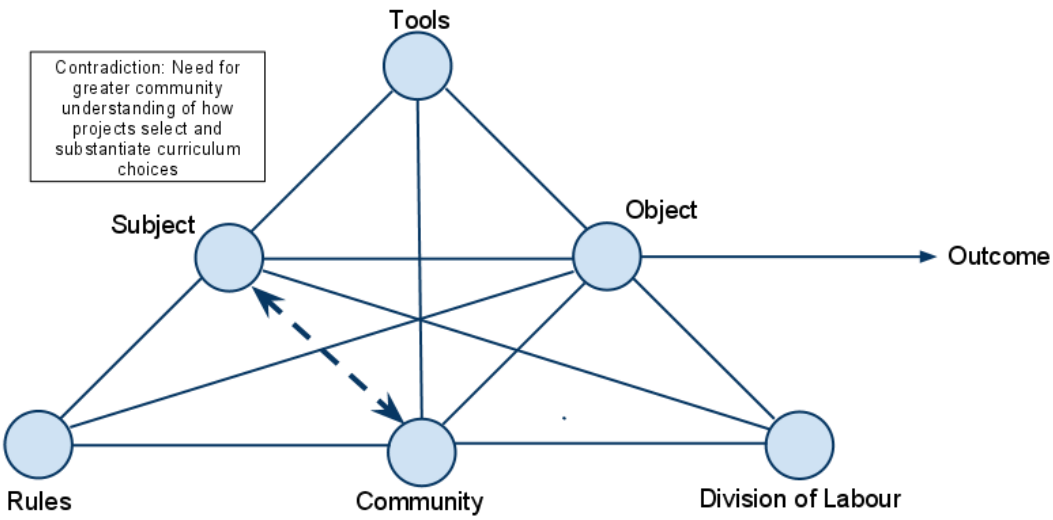

Figure 4.15 Tension between subject and the community

Perhaps there is an opportunity in using the centralised database, blogs, wiki and forums to help foster a sense of community earlier in volunteers' engagement with SHAWCO. One interviewee suggested that blogging may help externalise the thought process behind the creation of curriculum. In documenting this process new recruits could have a better understanding of the selection of

certain materials, how they were used, and how they were received. This could lead to greater continuity in processes behind the selection of curriculum materials as well as the curriculum itself.

4.4.3 How do roles and responsibilities enable or inhibit reuse?

The relationship and division of labour between the project leaders, curriculum coordinators, curriculum committee and volunteers appears to be dynamic and project specific. Some emerging tensions seemed to be around who is responsible for what in terms of sourcing and curating curriculum. The curriculum committee, as a new entity, is endeavouring to help the various projects find and share quality curriculum materials. For some of the interviewees it was not entirely clear what the role of curriculum committee would entail. There was some confusion about what specific support projects could expect to receive from the curriculum committee. This tension is thus between the division of labour and the subjects of the activity system (Figure 4.16). As commented upon earlier, in relation to making rules more overt, it could be advantageous to be more explicit about who is responsible for what, specifically across the various roles when collaboratively working on developing the curriculum.

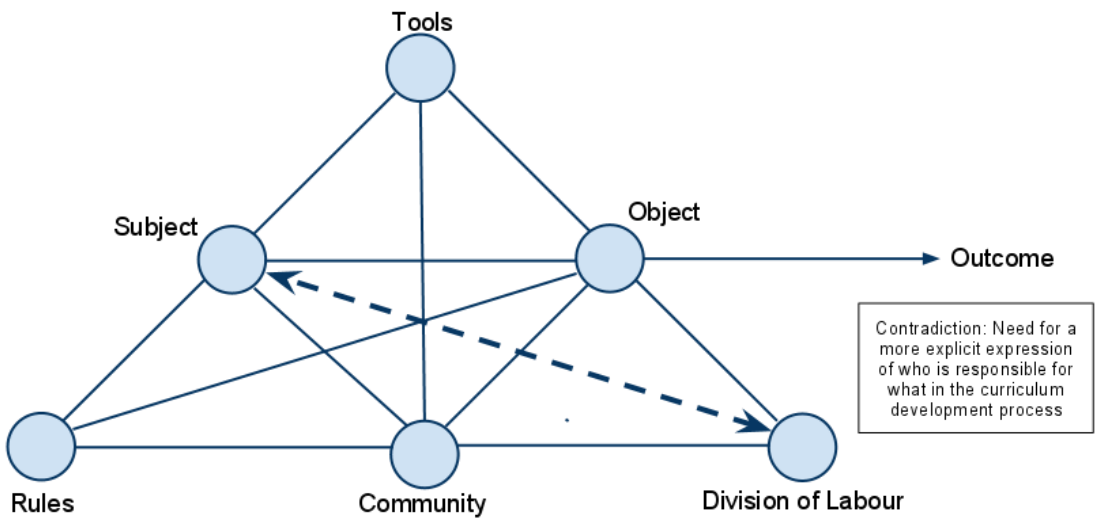

Figure 4.16 Tension between subject and division of labour

It is not surprising to find tensions within around the division of labour, especially within a volunteer organisation where people are already generously offering their time. However, if the responsibilities of the various roles were made more transparent to everyone, it might lead to more cooperation and a better understanding of accountability. Thus far projects have benefited or suffered when exceedingly enthusiastic or apathetic volunteers have participated. A more explicit definition of the type of commitment each role requires could help foster a more cohesive and satisfactory experience for SHAWCO volunteers at all levels.

4.4.4 How does technology enable or inhibit reuse?

In the past year new technologies have been introduced within SHAWCO to help volunteers share, discuss and find educational materials. The introduction of the Vula curriculum database is one of the innovations which is anticipated to encourage sharing, reuse, improvement and discussion of resources throughout the various projects.

The main tension that has emerged with regard to tool use is the capacity of Vula to facilitate the collaborative creation of curriculum materials from the community. While Vula has been quite reliable in terms of offering a place to store and curate materials, volunteers frequently mentioned its shortcoming as a collaborative authoring tool (Figure 4.17). Specifically the Vula wiki and forums were referenced as a challenge to use for novice users. This tension emerged as the curriculum committee was trying to encourage collaborative contributions to the curriculum development process. The facilities and technical aspects of the Vula system are apparently limiting participation in collaborative curriculum development.

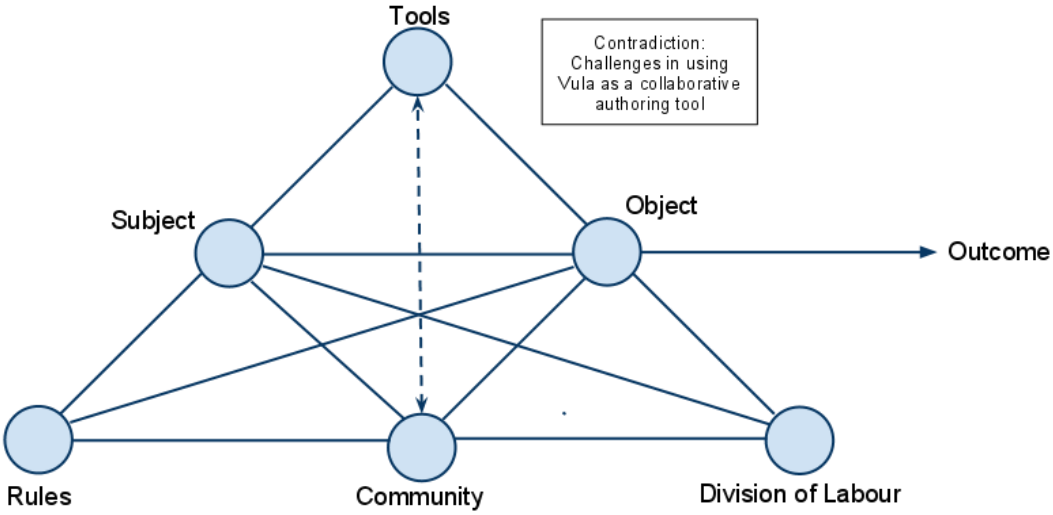

Figure 4.17 Tension between tool and community

To offset the limitations of the Vula collaborative tools, the curriculum committee has used collaborative tools such as Google Documents[43]. The collaborative features of Google Documents are quite sophisticated; yet again not all students are familiar with working in this environment. While Vula provides a familiar working space for most students in accessing resources, not all students have been exposed to the collaborative tools and facilities. It may be useful for Vula support staff at UCT to offer some assistance in the form of workshops or training on how to most effectively use the collaborative Vula tools.

Furthermore, volunteers commented quite widely on the vast amount of information available to them on the internet. There were challenges in locating and assessing good resources which were suitable for their specific context. Only once resources are located and assessed they can be downloaded and stored locally in the curriculum database. So there is still a need for students to be perusing the internet for quality educational materials. Two issues arise from this search and discovery process: the time required to locate and evaluate resources online; and the availability and cost in using the internet for this activity. The main contradiction found in relation to technology is that of the rules imposed upon SHAWCO regarding how they can use the internet (Figure 4.18).

[43] http://docs.google.com

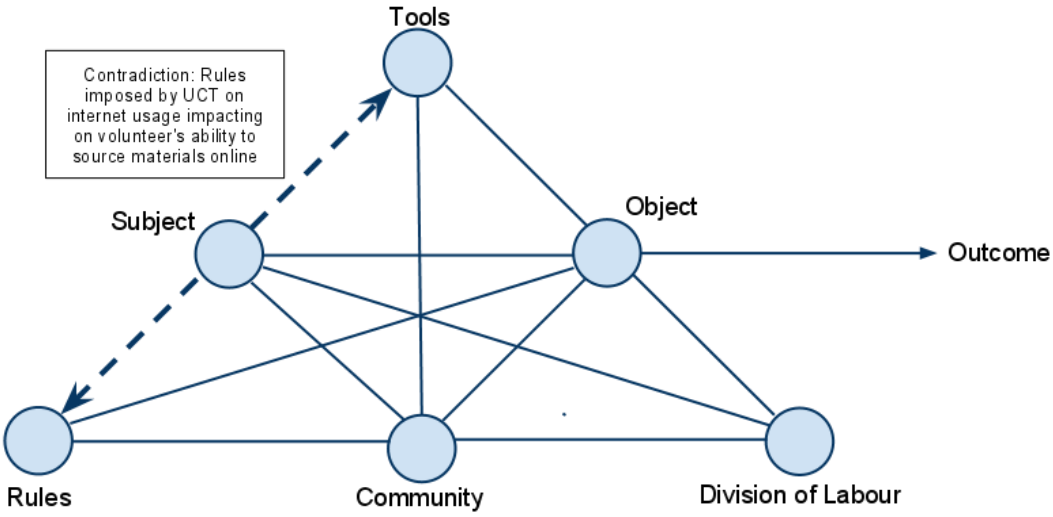

Figure 4.18 Tension between rules, subject and tools

Not being able to find quality materials for use in a social outreach programme for fear of exhausting their available internet quota, is of great concern. While this concern was mentioned explicitly by only one of the interviewees, I suspect that this may have be a concern of many volunteers at all levels. As the internet availability and quotas are increasing for students at UCT, I expect that this contradiction will be resolved in due course. In future the challenge will be finding quality materials online and curating them within the curriculum database.

4.5 Chapter summary

In this chapter I have presented the most significant data collected in relation to the research questions posed in this study. I have worked through the various themes and sub-themes presenting extracts from the data to illustrate what was discovered in this case study. I have taken an aggregate view of the data and analysed the data according to three distinct roles within SHAWCO. I then analysed the frequency of text spoken during the interviews. Finally I have explored tensions within the system using the activity system concept of contradictions. In the final chapter I will reflect upon the entire study and provide some recommendations for future research.

5 Summary and recommendations

In the final chapter I summarise the findings of this research in relation to the research questions and explore similarities and differences of my findings in relation to similar studies. The discussion seeks to expose some of the structural tensions which exist within the SHAWCO system of activity. Finally, I reflect on the limitations of this study and make recommendations for future research.

5.1 Summary of research questions

The overall aim of this study was to explore the perceptions of university student educators regarding the reuse of digital educational materials for community engagement projects. The specific question I aimed to address is: "What perceptions do student volunteers in the social outreach group SHAWCO hold about the reuse of digital educational materials?" Using the lens of an activity system I have explored the case of SHAWCO volunteers engaged in activity mediated by various contextual factors, including tools, the community, rules, and the division of labour (Engeström, 1987). These factors are understood to enable and limit relations between people and the object of their activity (Barab, Barnett, Yamagata-Lynch, Squire & Keating, 2002). I have framed this research in such a way in order to understand how these factors shape the decisions they make around reusing digital educational materials. The goal is to understand how organisations such as SHAWCO can better capitalise on the wealth of openly licensed educational content made available as a result of the OER movement.

The following discussion highlights the key research findings according to the research sub-questions.

5.1.1 What are the implicit rules around reusing digital educational materials?

The rules which constrain this activity system are both formally and informally defined by the rules, norms and conventions of the SHAWCO community. Some of the more informal or implicit rules which were teased out during the interviews suggest that when approaching digital educational materials, the rules around using other people's work seemed to be the greatest concern. The key findings regarding rules were: the students' uncertainty as to whether they were allowed to reuse materials created by their peers; the need for firmer rules around how materials are uploaded and stored in Vula; how students were using the internet as a resource and their uncertainty around copyright; and finally how the students' conception of plagiarism may be impacting on their practice.

It was interesting to find that students were uncertain of how they could reuse materials created by other SHAWCO students. Specifically, there was uncertainty around whether materials created by other volunteers in SHAWCO were even available for reuse, or whether permission was needed from the original author. This could lead to materials not being reused year after year and may have contributed to some of the instances where materials were recreated from scratch by new project leaders. The creators of materials in this study noted that they were generally happy to have their works used by other SHAWCO projects. A more deliberate culture of reuse should be encouraged so that people are aware of their ability to reuse, improve and redistribute curriculum materials throughout SHAWCO. Since a great deal of time and effort goes into the curriculum development process, materials should ideally be reused, revised, remixed and redistributed as often as possible

(Wiley, 2008). This process of reuse towards improvement may lead to high quality curriculum materials built upon the experiences of volunteers already working in the community.

One way for SHAWCO to reduce some of the tensions around reusing others materials is to apply open copyright licenses such as Creative Commons to all curriculum materials created within SHAWCO. By simply making the terms of reuse explicit, SHAWCO curriculum stakeholders may help reduce the uncertainty of new volunteers when interacting with SHAWCO curriculum materials for the first time. Adopting Creative Commons could also help spread the culture of open education, to which the SHAWCO education project is closely aligned. Furthermore, this could be a valuable way of introducing students to alterative licenses for digital content in other spheres of their personal and professional lives.

Rules around how materials are curated within the SHAWCO curriculum database on Vula are emerging, but largely informal at present. As materials are edited and improved throughout the semester, someone has to be tasked with uploading the latest version of the file on the system so that all volunteers have access to the latest version. The SHAWCO curriculum committee is taking the lead in establishing the process of curation in collaboration with the curriculum coordinators and project leaders. However, each project has different needs, terms for curriculum review and type of materials. Perhaps more explicit documentation of the general rules around this process would help formalise the working relationship between the curriculum coordinators, project leaders and curriculum committee.

When using the internet as a resource for finding curriculum materials, interviewees seemed to have some misconceptions about resources “freely available” online and the actual legal terms under which the online resources had been released. Interviewees noted their limited understanding of copyright and fair use policies when sourcing online content. While they were generally aware that they needed to obey rules around copyright, they were also often under significant pressure to find relevant materials in a short space of time. This meant that they sometimes wittingly made use of materials which they knew were under copyright. In many respects the findings were similar to that of Harley et al. (2006), as volunteers generally did not have a clear understanding of how copyright laws applied to materials sourced online for use within the classroom. Students are not yet being formally educated on how to use the internet as a resource or how to work with content found online in a responsible way. So the anarchic nature of using online materials reported in the studies by Calverley & Shephard (2003) and Harley et al. (2006) seem to be comparable in this context. The findings of this study suggest that there needs to be more emphasis on creating awareness of copyright in a digital age among SHAWCO volunteers and exploring ways of using alternative licenses models such as Creative Commons.

Despite the misunderstandings around online copyright, students were well aware of the rules around plagiarism. Plagiarism is a significant issue among students as they are expected to produce original works for assessment in their studies. I believe it could be quite confusing to a student wanting to help spread education in the community, yet being lectured to about plagiarism and piracy. Throughout 2010–2011 UCT ran an anti-piracy campaign in student computer labs on campus strongly condemning the copying of digital materials. Perhaps there is a need to separate plagiarism and piracy from instances where the reuse of materials in legal ways can actually be

encouraged. As OER are gradually becoming more widely available, there seems to be an opportunity for educators as well as students to creatively combine and remix materials legally, rather than to continually create resources from scratch.

The rules under which SHAWCO volunteers operate extend well beyond the borders of the organisations. They experience the norms and standards of the institution and society at large. Exploring SHAWCO activity within the framework of an activity system has allowed me to describe some of the tensions which exist within this contextualised activity. Informal or formal rules which SHAWCO volunteers understand to govern their activity may have the potential to significantly limit their overall mission. These tensions are inconsistent with the ultimate motive behind SHAWCO's activity. For instance, explicitly communicating the rules around reusing materials and ensuring they are stored in the SHAWCO database may increase the frequency of reuse. This would give SHAWCO volunteers improved tools with which to work and achieve their mission. This may result in enhanced educational experiences within the projects. Moreover, a greater understanding of the rules around copyright, fair use, and openly licensed materials could ease volunteers' uncertainty around sourcing and combing curriculum materials, thereby leading to higher quality materials and more responsible practice. Identifying and addressing these tensions may help to improve the outcomes of SHAWCO's work.

5.1.2 What role does the community play in facilitating reuse?

As I engaged with SHAWCO, I discovered a rich and vibrant community, both during my presence in the curriculum workshop and in communication with SHAWCO volunteers. There is a general sense of comradeship among volunteers throughout all of the projects. This community is gradually also moving online as web tools such as Vula are being used for communication and provide a platform for collaborative curriculum development. The key issue which arose around community was the emerging opportunity for more co-operation with other social outreach groups at UCT. Additionally, there seems to be a communal need for better documented and shared teaching practice to sustain SHAWCO's curriculum materials.

One of the most intriguing findings of the research was that all of the interviewees indicated a willingness to engage with other social organisations at UCT. There seems to be a great opportunity for the various outreach organisations at UCT to be working together and sharing resources throughout their programmes. This is in contrast to the findings of Hatakka (2009), who found that teachers believed it was their responsibility to be creating original teaching materials for their students. Respondents were all quite positive about the possibility of both resource sharing and collaboration with organisations which have similar intentions. While the context in which each organisation works is quite varied, there may be a genuine opportunity for working groups around curriculum development, pedagogy, games in teaching, multilingual teaching, or community engagement in general. During 2011 a group of SHAWCO volunteers formed the Education Think Tank[44], a forum to discuss education matters more broadly with other organisations or institutions. This forum may be an excellent opportunity for SHAWCO volunteers to share some of the tacit knowledge that they have gained in their own work, and explore and engage with other organisations committed to education.

[44] http://www.facebook.com/home.php?sk=group_104367639647479

Finding a way to sustain continuity in the curriculum, maintaining the quality and improving iteratively within the community, was seen as a great concern to interviewees. In order to achieve this, SHAWCO volunteers must actively engage in curating resources and their associated learning designs. As Conole et al. (2010) argue, the sharing of well-documented learning activities can foster reuse by giving newcomers ideas for pedagogically sound activities which make use of the educational resources. Interviewees noted the desire for a method in which they could document their curriculum development choices, so that others could understand the thought process behind how materials were selected. Ideally these reflections should be curated with the resources as well. This may also help to share good teaching practices within the community of volunteers (Littlejohn et al., 2003; Philip & Cameron, 2008).

The object of SHAWCO's work is to improve the quality of life for individuals in developing communities. There are a number of similar organisations at UCT, such as Ubunye and TeachOut, who espouse similar goals for their own outreach programmes. A similar activity system analysis could be conducted with either of the two organisations and would certainly surface some parallels to the situation within SHAWCO. So what we may find is three activity systems working towards a shared object, all of which could also be sharing teaching resources (mediating artefacts), processes (rules) and labour (division of labour). These organisations, currently acting in isolation, may benefit from more explicitly sharing their objective of community service with one another openly.

5.1.3 How do roles and responsibilities enable or inhibit reuse?

Due to SHAWCO's nature as a volunteer organisation, it is challenge to impose strict rules around who is responsible for what in terms of curriculum development. The key issue which arose around roles and responsibilities was the challenge of working collaboratively on curriculum development.

Interviewees spoke at length of the challenge of collaborating on materials development within the organisation. Students are battling with multiple commitments in addition to their volunteer interests. Naturally there can be instances where the intended division of labour does not happen as planned. Within the segment of individuals I worked with in this study, roles were seemingly quite well defined. The only role which has an emerging set of responsibilities is the curriculum committee. As the curriculum committee is still quite new, there seems to be some misunderstanding of exactly what others can expect from them as a unit. Their intentions might be shared more openly within SHAWCO to enable others to better understand their role within the organisation.

It seemed that most of the challenges around collaboration had to do with the decentralised nature of materials and loosely enforced rules around how materials are shared. The curriculum committee has taken an admirable move in attempting to centralise the curriculum development process within the Vula curriculum database. Furthermore, by providing administrators to help organise the site, materials may gradually become more structured, discoverable and available for reuse.

As this study focused on three distinct roles involved in the curriculum development process, I was able to explore and analyse the different ways they spoke about their work in Chapter 4. Understandably, volunteers in differing roles have dissimilar actions and operations which they perform and are responsible for in order to carry out the shared object of the organisation. Perhaps

by having exposed some of the differences in which each role contributes to SHAWCO's mission, this research offers a useful account of the diverse conditions in which SHAWCO volunteers operate.

As the curriculum committee is a fairly new role within SHAWCO, it will be interesting to see how their activities lead to change within the organisation. As their primary responsibility is to curate and share high quality curriculum materials among the projects, there is a real opportunity to increase the reuse of materials in the future.

5.1.4 How does technology enable or inhibit reuse?

Interviewees have for the most part embraced technology in order to help assist the process of materials development. Technology has enabled volunteers to communicate with one another, transfer materials, curate materials, collaborate on materials, and discuss content. These technologies have become almost ubiquitous in the curriculum development process.

Community-driven curation is becoming possible through the Vula curriculum database and resources are gradually being organised and made available to all volunteers. Most of the resources which are being curated for use within SHAWCO are being downloaded and stored locally in Vula. SHAWCO has therefore primarily adopted the institutional content curation model, as discussed in Chapter 2. In very few instances SHAWCO is curating metadata about resources on the internet via social bookmarking services or web aggregators. Since files are hosted and stored locally, a number of the interviewees noted that they recognised the need for both the MS Word and PDF format of the files to be curated together. This will help ensure that volunteers seeking content can both edit a resource or simply print it out for use.

The Vula curriculum database does not yet afford the ability to add descriptive metadata which could help volunteers searching for content within the database. The search tool within Vula is not as sophisticated for searching and discovering resources as might be desired. The curriculum committee is trying to explore ways of using the forums and wiki in Vula to add contextual and descriptive information to resources. Under these conditions, SHAWCO appears far from adopting some kind of metadata standard such as IMS, SCORM project or Dublin Core, as discussed in Chapter 2. Furthermore, Vula does not currently allow one to indicate that the materials uploaded are available for reuse under licenses such as Creative Commons. As discussed in Chapter 4, the copyright terms which are currently available for selection when a user uploads a document are largely misunderstood or simply ignored.

To combat some of these challenges around curation, resources are currently being carefully structured within directories in the Vula resources according to project, year and level. I believe this is a good start to helping ensure volunteers can find the resources they need. As the use of new tools such as Vula grows, a richer and vibrant online community may develop within SHAWCO which could be useful to help support the sharing and reuse of resources. Hopefully the Vula tool itself will also evolve, making it easier to add metadata as well as more relevant copyright terms.

One of the significant findings with regard to technology was how limiting the bandwidth available to UCT students could in fact affect the opportunity for curriculum developers to search and discover quality materials online. The internet allowance at UCT is designed to give students access to the internet for their studies, but remains unchanged if students are also engaging in social

outreach activities. The findings of this research suggest that it takes time and care to find appropriate resources for use in SHAWCO's education programme. Social outreach is a distinguished element of the institution's engagement with the community (Favish, 2007). It is thus recommended that the institution give students engaging in social outreach all the tools needed to serve the community with high quality educational materials.

As the availability of bandwidth in South Africa is increasing with the arrival of the SEACOM (2009) fibre optic cable, the cost of bandwidth should decrease and availability should increase. This will hopefully give students even more freedom to search and discover educational materials online, use collaborative technologies for curriculum development and further share the remarkable work they do in the community. The presence of more bandwidth also has the potential to facilitate and encourage the sharing and reuse of digital educational resources. This will enable the UCT community to access bandwidth-intensive resources such as video, podcasts and rich media which they may choose to use in, or as a model for, their own teaching and learning. It will be interesting to see how the new internet quota of 3 gigabytes per month may help to increase opportunities for volunteers' sourcing materials online.

Although only one of two projects explored in this study had purchased texts for use in their education programmes, educational materials available online under open copyright are ever increasing. The opportunity to make use of OER as an alternative to expensive textbooks is a definite prospect for organisations such as SHAWCO. In preparation for the second semester of SHAWCO activities, a document was sent out to all curriculum developers which referenced a number of open education repositories. The document entitled "Very Important and Great Curriculum Resources"[45] indicates to me that these exciting opportunities enabled by technology and the open movement are starting to be realised.

5.1.5 Summary

An activity system is not a static model representing collective human activity, as the activity system is constantly evolving and developing as contextual factors change within the environment. Rules, roles, community and tools will change, and with them new tensions will emerge. This aim of this case study was to document some of the systemic tensions driving development in the SHAWCO activity system in order to help inform the evolution of their activity. I hope this research can serve to elucidate tensions or ambiguities which may be limiting the reuse of digital educational materials within SHAWCO.

5.2 Limitations of the study

This study was limited in scale and is representative of only a minority of events and opinions within SHAWCO. I believe it is a good starting point for future researchers interested in researching SHAWCO volunteers' use of technology in curriculum development. SHAWCO as an organisation is seemingly under-researched, as I could find very limited research prior to beginning this study.

The OER movement is quite a new phenomenon and has also generally been under-researched. No established theoretical or conceptual framework has been employed across a range of studies. This

[45] See Appendix E for this document

research has thus been quite novel with very little prior research within which to situate it. The activity system (Engeström, 1987) provided a useful lens to explore object oriented human activity in this context.

Due to the limited nature of the study, the research findings are not generalisable as a whole. However, I firmly believe that the findings suggest particular areas of interest for future research and/or intervention. Primarily, the way in which students understand and work with digital copyright is a key area that needs to be further explored in this context. One may also further explore how groups of educators curate online resources for use in teaching. It would be interesting to see whether SHAWCO in future begins to curate links to resources on the web rather than downloading and storing content within Vula. Furthermore, as the availability of digital educational resources and their associated file formats will be continually evolving over time, it would be useful to explore how the methods in which resources are curated also evolve.

Lastly, due to the fact that the curriculum committee is quite a new entity within SHAWCO, their roles and responsibilities around curriculum development are still emerging. Once more firmly entrenched in the broader organisation, I believe the curriculum committee will have great potential to make a positive effect on SHAWCO curriculum processes. More specifically, I see a great opportunity for the SHAWCO curriculum committee to contribute to helping people involved in curriculum design move towards more open practices.

5.3 Conclusion

This study has documented the case of SHAWCO students devoted to help improve the quality of life in their community through education. Simultaneously, advances in technology and the increased commitment of educational institutions in opening up access to educational materials are creating an exciting landscape in which to operate.

> *Today, a confluence of events is creating the perfect storm for significantly advancing education. With a growing inventory of openly available educational tools and resources, and with an increasingly engaged and connected community, transformative opportunities for education abound.*
>
> *The good news is that the emerging open education movement in higher education and beyond is beginning to change the way educators use, share, and improve educational resources and knowledge by making them open and freely available.' (Iiyoshi & Vijay Kumar 2008:2)*

We live in changeable and exciting times as knowledge and information is becoming increasingly available via the internet. Organisations such as SHAWCO represent the last mile for some of this information reaching impoverished communities in present-day South Africa.

SHAWCO students are quite forward thinking about sharing and reusing internet resources to help others gain access to knowledge. I hope this study has helped expose some of the tensions that SHAWCO volunteers experience in this bounded context; for it is in understanding this context as a determinant of both cause and effect that we can explore ways in which individuals are innovating and moving towards new practices. This study has reinforced that it is largely human factors which

are limiting some of the potential afforded by new technologies and the OER movement. SHAWCO is well poised to develop a culture of reusing materials as the curriculum database is now online and students' awareness of using online materials is broadening. I see great potential for a student outreach programme to benefit from the material being shared by the OER community. Nearly all of the conditions are in place for these freely available materials to be put to good use for community engagement.

5.4 Recommendations for further research

As the Vula curriculum database matures and becomes more actively embedded in the SHAWCO curriculum development process, there should be ample opportunities to explore how this centralised system is contributing to curriculum quality. The core set of tools being offered in Sakai will undoubtedly mature and become more intuitive providing for more collaborative document management and creation. An exploration of how curriculum development processes within SHAWCO change as a result of advancing technological tools could provide an interesting study.

It will also be interesting to see if SHAWCO begins to use cell phones, tablets or computers in their education programmes. With the high cell phone penetration rate in South Africa there may be opportunities to use this medium for ongoing engagement with learners. Tablets and smart phones are also becoming increasingly popular with university students and it would be interesting to look at how these devices can be used in community classrooms.

Lastly I believe that the issue of copyright in the information age and how students understand this terrain is of paramount interest for future research. The research suggests that institutions could be providing more guidance to students on how to work with copyright and alternative copyright licenses such as Creative Commons. An analysis of the perceptions of students around copyright could form an excellent study.

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