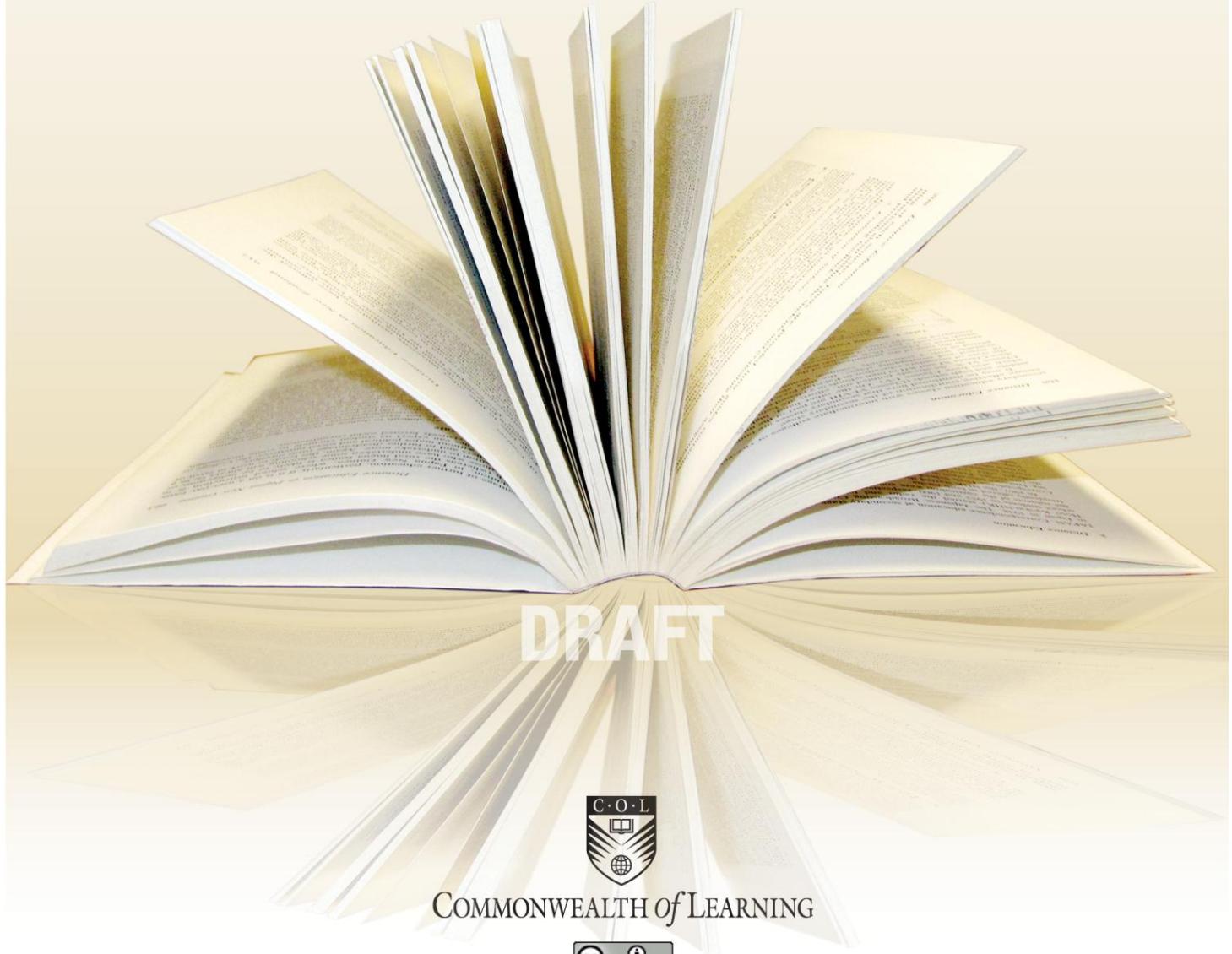


Exploring the Business Case for **OER**

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for the Commonwealth of Learning



COMMONWEALTH OF LEARNING



Foreword to the Preliminary Version

The Open Educational Resource (OER) movement, which began at the turn of the millennium, was motivated by the ideal that knowledge is the common wealth of humankind and should be freely shared. Most institutions that decided to implement the ideal by creating OER relied on donor funding, notably from the William and Flora Hewlett Foundation, which has demonstrated an admirable combination of consistency and flexibility in funding the OER movement around the world.

As the OER movement took off, however, questions about its sustainability became increasingly pressing because it could not continue to rely indefinitely on donor funding. Institutions and governments began to review the economics of OER in order to determine whether there was a business case for investing in their production and use.

It is against this background that I am delighted to welcome this preliminary version of an essay by Neil Butcher and Sarah Hoosen on *The Business Case for Open Educational Resources*. It was commissioned by the Commonwealth of Learning as an input to the World OER Congress organized by UNESCO in June 2012. This first version is a work in progress that will be refined and finalised in the light of experiences and results presented at the Congress.

The authors do an excellent job of situating the contribution of OER in the wider context of the challenges facing education at all levels in an era of economic stringency. They relate OER to the realities of the teaching-learning process, arguing that greater reliance on resource-based learning, rather than large-group teaching, will be essential if wider access to education of quality is to be achieved.

Creating high-quality learning resources *ab initio* is expensive, but Neil Butcher and Sarah Hoosen present compelling evidence that using OER can reduce this cost substantially. They also present some startling analyses of the economics of textbook production, which again show that systematic processes of investing in OER can create huge savings for governments and students. The commercial publishing industry can play a part in this process.

The 2012 World OER Congress will greatly increase awareness of the potential of OER amongst governments and institutions. If this awareness is to lead to greater reliance on OER, then those who develop and use OER will need to be confident of the economic and business case for so doing. The authors have provided a solid basis for debating the business case in a variety of settings. I invite readers to take the debate forward and point the authors to any additional sources of data that might enrich the paper so that the post-Congress version of this report can reflect an even wider understanding of how to use OER to expand and improve education while cutting its cost.

Sir John Daniel
Project Director
Fostering Governmental Support for OER Internationally

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1 The context of OER

1.1 Global trends and challenges in education

In today's knowledge society, knowledge and skills play a major role in reducing poverty and promoting growth. The future of countries is increasingly dependent on the knowledge, skills, and resourcefulness of their people. Education is of vital importance in the knowledge society, as a source of basic skills, a foundation for development of new knowledge and innovation, and an engine for socio-economic development. It is, therefore, a critical requirement in creating knowledge societies that can stimulate development, economic growth, and prosperity.¹ This has resulted in educational institutions around the world striving to satisfy ever-increasing demand for education in response to a growing and urgent need to train, retrain, and continuously refresh the knowledge and skills of each nation's workforce in an increasingly globalized knowledge economy. While systems worldwide have expanded significantly in making progress towards basic education for all (EFA) and achieving universal primary education, countries continue to face challenges of expanding access to education, improving quality, and ensuring equity, particularly in higher education. As developing economies require skilled personnel, access has become an increasingly important issue.²

Whilst there is an unprecedented demand for access to higher education, most governments also face challenges in providing the necessary support to public institutions.³ There is much debate about how to fund expanding academic systems, with current approaches emphasizing the need for students to, at least, share the cost of instruction. This new thinking, combined with constrictions on public expenditures in many countries, has created financial problems for institutions and education systems.⁴ Although an educated population is a key factor in enhancing economic productivity and creating a knowledge economy, it is an expensive undertaking.⁵ Academic systems and institutions have tried to deal with these financial constraints in several ways. Loan programmes, the privatization of some public institutions, and higher tuition fees are among the alternatives to direct government expenditure. In many parts of the world, including several major industrialized nations, conditions of study have deteriorated in response to financial constraints. Enrolments have risen, but resources, including teaching staff, have not kept up with needs. Academic infrastructures, including libraries and laboratories, have been starved of resources, and reduced funds are being spent on basic research.⁶ The results – deterioration in average quality, continuing inter-regional, inter-country and intra-country inequalities, and increased for-profit provision of higher education –

¹ Butcher, N. (2010) ICT, Education, Development and the Knowledge Society, p.6. Retrieved from [http://www.gesci.org/assets/files/ICT,%20Education,%20Development,%20and%20the%20Knowledge%20Society\(1\).pdf](http://www.gesci.org/assets/files/ICT,%20Education,%20Development,%20and%20the%20Knowledge%20Society(1).pdf)

² Altbach, P.G., and Peterson, P.M., (1999). Higher Education in the 21 st Century: Global Challenge and National Response. Institute of International Education and the Boston College Center for International Higher Education. HE Research Report Number Twenty-nine

³ Power, C.N. (2000). Global Trends in Education. International Education Journal Vol 1, No 3, 152-163.

⁴ Altbach, P.G., and Peterson, P.M., (1999). Higher Education in the 21 st Century: Global Challenge and National Response. Institute of International Education and the Boston College Center for International Higher Education. HE Research Report Number Twenty-nine

⁵ The Issues that Challenge Global Education - International Professors Project

⁶ Altbach, P.G., and Peterson, P.M., (1999). Higher Education in the 21st Century: Global Challenge and National Response. Institute of International Education and the Boston College Center for International Higher Education. HE Research Report Number Twenty-nine

are recognized as having serious consequences, particularly for developing countries and disadvantaged groups.⁷

Faced with funding shortfalls, many educational institutions are looking to new markets and adopting a more market-orientated approach to offset their operational costs.⁸ Open and Distance Learning (ODL) is increasingly being seen as a strategy to tackle the challenges of access, quality, and equity. Many countries are deploying ODL models in order to meet the growing demand for education, embracing ODL as a cost-effective and efficient means of increasing access to education. Its promise and possibilities are also being explored and implemented by many contact universities faced with the same kinds of technological advances, constraints, dynamics, and challenges as those that have caused traditional distance education institutions to turn to ODL models of provision. In addition, Information and Communication Technology (ICT) has created a revolution in ODL by offering new and more flexible learning opportunities, providing tools needed to extend education to under-served geographical regions and groups of students, and empowering teachers and students through improved access to information.

ICT refers to technology that is used in the manipulation, storage, and conveyance of data through electronic means.⁹ ICT allows for exponential increases in the transfer of data through increasingly globalized communication systems, and connecting growing numbers of people through those networks. It reduces barriers to entry of potential competitors to traditional education institutions, by reducing the importance of geographical distance as a barrier, by reducing the overhead and logistical requirements of running education programmes and research agencies, and by expanding cheap access to information resources. The availability of digital libraries, mailing lists, and online classes impacts on the way education is delivered, particularly at a distance. E-learning continues to grow in importance in different parts of the world. Indeed, some educational planners see it as one of the few relatively unrestricted avenues for innovation in teaching and learning.

Whilst the dominant focus has historically been on e-learning, its use for management, administration, and research are also increasingly recognized. Technological change has brought – and continues to bring – profound changes in the roles that researchers, funders, research institutions, publishers, aggregators, libraries, and other intermediaries play in disseminating and providing access to quality-assured research outputs, in their goals and expectations, and in the services they provide and use.¹⁰

Ubiquitous and ever-opening access to information creates a need for skilled workers who can transform information to meaningful, new knowledge. The potential of ICT to tackle key socio-economic challenges, and thereby impact on development, has led many countries to invest heavily in it, placing it at the centre of their development strategies, particularly in higher education.¹¹ The growth of knowledge societies has placed increasing emphasis on the need to ensure that people are information literate, and therefore education systems are faced with a need to provide formal instruction in information, visual, and technological literacy, as well as in how to create meaningful content with today's tools. However, it is important to consider expanded definitions of these literacies that are based on mastering underlying concepts rather than on specialized skill sets.

⁷ Power, C.N. (2000). Global Trends in Education. *International Education Journal* Vol 1, No 3, 152-163.

⁸ Harsh, O.K., and Sadiq, S.M.(2002). Role of Delivery, Course Design and Teacher-Student Interaction: Observations of Adult Distance Education and Traditional On-Campus Education. *The International Review of Research in Open and Distance Learning*. Vol 3(2)

⁹ OpenLearn. (no date). ICTs in everyday life. Retrieved from <http://labspace.open.ac.uk/mod/resource/view.php?id=371982>

¹⁰ Hall, S. (2010). A commentary on 'The economic implications of alternative publishing models, *Prometheus*, 28(1); 73-84

¹¹ Butcher, N. (2010) ICT, Education, Development and the Knowledge Society, p.9. Rretrieved from [http://www.gesci.org/assets/files/ICT,%20Education,%20Development,%20and%20the%20Knowledge%20Society\(1\).pdf](http://www.gesci.org/assets/files/ICT,%20Education,%20Development,%20and%20the%20Knowledge%20Society(1).pdf)

Education systems need to place increased emphasis on key basic and advanced skills if they are to produce skilled people to meet changing economic demands.¹² Critically, ICT is valuable as a *means* to achieve genuine knowledge societies. Thus, education systems are faced with a need to provide formal instruction in information, visual, and technological literacy, as well as in how to create meaningful content with today's tools.

Accompanying this has been growing recognition of the importance of lifelong learning. Lifelong learning is regarded as a requirement to keep pace with constantly changing global job markets and technologies. Education is regarded as not limited to formal education in traditional structures, but also encompassing the broader societal learning necessary for development.¹³ Lifelong learning is essential both for closing existing equity gaps and for adults' ability to adapt to a changing work place. Lifelong continuous learning is no longer a choice, but a necessity both to empower a person's wellbeing and inclusion in 21st century society and to support individuals to meet the requirements for their professional performance. In addition, traditional school-based, formalized learning formats are not capable anymore to adequately accommodate the complete range of learning needs.¹⁴

Another trend is the increasing privatization of educational goods and services. For example, in North America, the Education and Training industry is the fifth largest export and accounts for nearly 10 per cent of GDP.¹⁵ In Africa, there has been rapid growth in the number of private and distance learning tertiary institutions. This growth has been attributed partly to existing public institutions no longer being able to cope with increasing populations and an accompanying growth in demand for education.¹⁶ Some countries also see a trend towards private tutoring. More than half of students in secondary school receive private tutoring in countries like Japan, Mauritius, and Republic of Korea. Likewise, in Indonesia, of the roughly 3,000 higher education institutions in the country, only around 500 are public institutions. Such growth seems to be a social response to inadequacies in government support for education, and can lead to further exacerbation of social inequalities and polarization.¹⁷

One of the national challenges, particularly facing developing countries, is to provide high quality, relevant education that is relevant to future labour markets and to developing the knowledge society.¹⁸ Thus content in education programmes, at both school and university levels, needs to be relevant and continuously updated to respond to global changes and for students to be equipped with skills to participate in the knowledge economy. This is occurring in a context of increasing student enrolments, while needing to maintain or improve standards of quality and relevance of the courses they take. This highlights the need for increased investment in curriculum/course design and development and the need for better quality materials as part of a broader process of improving education programmes.

¹² Levy, F. and Murname, R. (2006). How Computerized Work and Globalization Shape Human Skill Demands. Unpublished paper.

¹³ Butcher, N. (2010) ICT, Education, Development and the Knowledge Society. Retrieved from [http://www.gesci.org/assets/files/ICT,%20Education,%20Development,%20and%20the%20Knowledge%20Society\(1\).pdf](http://www.gesci.org/assets/files/ICT,%20Education,%20Development,%20and%20the%20Knowledge%20Society(1).pdf)

¹⁴ De Langen, F.H.T. (2012) Positioning the OER Business Model for Open Education. European Journal of Open, Distance and E-Learning. Retrieved from <http://www.eurodl.org/?article=483>

¹⁵ Power, C.N. (2000). Global Trends in Education. International Education Journal Vol 1, No 3, 152-163.

¹⁶ Barasa, F.S. (no date). Promoting Open and Distance Learning In Africa: A Critical Reflection on Rhetoric, Real and Ideal. Retrieved from http://events.aau.org/userfiles/file/corevip11/papers/fred_barasa_Promoting_ODL.pdf

¹⁷ Power, C.N. (2000). Global Trends in Education. International Education Journal Vol 1, No 3, 152-163.

¹⁸ Schwartzman, S. (2003). The Challenges of Education in Brazil. Retrieved from <http://www.drclas.harvard.edu/files/Simon-Schwartzman-Challenges-of-Education-in-Brazil.pdf>.

1.2 The OER Value Proposition

For the first time in human history we have the tools to enable everyone to attain all the education they desire¹⁹

Within the above context, the concept of open educational resources (OER) has gained significant currency around the world and become a subject of heightened interest in policy-making and institutional circles, as many people and institutions explore its potential to contribute to improved delivery of education and tackle some of the key problems facing education systems. OER refers to educational resources that are freely available for use by educators and learners without an accompanying need to pay royalties or licence fees. The term was first adopted at UNESCO's 2002 Forum on the Impact of Open Courseware for Higher Education in Developing Countries. The Commonwealth of Learning (COL) has adopted a wide definition of OER as 'materials offered freely and openly to use and adapt for teaching, learning, development and research'. While OER are mainly shared in digital formats (online and offline), OER can also be in printable formats.²⁰ The COL/UNESCO Basic Guide to OER refers to OER as:

Educational resources (including curriculum maps, course materials, textbooks, streaming videos, multimedia applications, podcasts, and any other materials that have been designed for use in teaching and learning) that are openly available for use by educators and students, without an accompanying need to pay royalties or licence fees.²¹

Kanwar et al (2010) note that OER are generally understood as (1) free and freely available, (2) suitable for all levels of education, (3) modular, (4) reusable, and (5) online. They base this definition on the assumption that OER would be small reusable learning objects located in online repositories that institutions can access, adapt, and construct as courses. However, they also note that the notion of OER has evolved and changed.²² For example, the term OER is also synonymous with Open CourseWare (OCW), although the latter may be used to refer to a specific, more structured subset of OER. The OCW Consortium defines Open CourseWare as 'a free and open digital publication of high quality university-level educational materials. These materials are organized as courses, and often include course planning materials and evaluation tools as well as thematic content'.²³ Another related concept is Open Access (OA) publishing. This usually refers to research publications released under an open license. Especially in higher education, there is an overlap between OER and OA, as research publications typically form an important part of the overall set of materials that students need to access to complete their studies successfully, particularly at postgraduate level.²⁴

The concept of OER has partly gained momentum in recognition of its potential to contribute to creating a revolution in education. One of the key principles underlying OER is the right to education by all, and making information and knowledge more relevant, accessible and useable for the good of the public who want to consume this knowledge.²⁵ OER opens up greater possibility for adapting

¹⁹ Wiley, D., Green, C., and Soares, L. (2012). Dramatically Bringing Down the Cost of Education with OER - How Open Education Resources Unlock the Door to Free Learning. Educause

²⁰ Commonwealth of Learning. Open Educational Resources. Retrieved from <http://www.col.org/resources/crsMaterials/Pages/OCW-OER.aspx>

²¹ Butcher, N. (2011). A Basic Guide to Open Educational Resources (OER). UNESCO and Commonwealth of Learning. Retrieved from <http://www.col.org/resources/publications/Pages/detail.aspx?PID=357>

²² Kanwar, A., Kodhandaraman, B., and Umar, A. (2010). Toward Sustainable Open Education Resources: A Perspective from the Global South. *The Amer. Jnl. of Distance Education*, 24:65–80, 2010

²³ OpenCourseWare Consortium. What is OpenCourseWare. Retrieved from <http://www.ocwconsortium.org/aboutus/whatisocw>

²⁴ Butcher, N. (2011). A Basic Guide to Open Educational Resources (OER). UNESCO and Commonwealth of Learning. Retrieved from <http://www.col.org/resources/publications/Pages/detail.aspx?PID=357>

²⁵ Butcher, N. (2011). A Basic Guide to Open Educational Resources (OER). UNESCO and Commonwealth of Learning. Retrieved from <http://www.col.org/resources/publications/Pages/detail.aspx?PID=357>

existing resources for a better fit with local contextual and cultural needs, as well as the accessibility needs of learners, thereby increasing access to education. In particular, it is regarded as providing great benefits for the global South (countries of Africa, Central and Latin America, and most of Asia) in expanding access to education. By removing economic and ownership barriers, OER enables people across continents and organizations to get the education they need in order to transform their talents into personal and professional competence.²⁶ Its transformative potential is theoretically realized in the ease with which resources, when digitized and openly licensed, can be shared freely via the Internet.²⁷

However, despite this potential, it has been argued by some that OER is still mainly created in the developed world. There are concerns that the dominance of developed countries over the production of OER risks relegates developing countries to the role of mere consumers.²⁸ It is true that OER initiatives are beginning to emerge in the developing world—such as Sakshat in India, the China Open Resources for Education initiative, the OER UCT (University of Cape Town) project in South Africa, and the Vietnam OpenCourseWare initiative—but these are regarded as exceptions.²⁹ In addition, it remains true across the wider research that most of the barriers to use of OER are the same as/or a consequence of more generic barriers to accessing and using technologies for learning.³⁰

Kanwar et al (2010) point out that the role of OER is increasingly changing from principally a teaching resource to a learning resource, reflecting wider educational trends towards more learner-centred models (and lifelong learning). Thus, students now constitute the majority of users of OER rather than teachers and institutions.³¹ This often happens without the involvement of educational institutions. A case in point is the Khan Academy, a non-profit online education platform where students of all ages can view ten-minute lessons on mathematics, the sciences, finance, and history. Their approximately 3.5 million users per month³² include middle and high school students, homeschoilers, college students, academically advanced students, autistic students, retirees, classroom teachers, and teacher training institutions.³³

OER is also regarded as providing the potential to build capacity by providing institutions and teaching staff access, at relatively low cost, to the means to create and adapt high quality teaching and learning materials. It can be harnessed to develop competence in producing educational materials and carrying out the necessary instructional design to integrate such materials into high quality programmes of learning. This is in recognition that, while teaching staff are expected to have the knowledge and skills to teach in a broad spectrum of subjects, they often lack the time to re-visit and modify curriculum and educational materials on a regular and systematic basis. OER is believed to provide an opportunity to engage higher education faculties, academics, and teachers in

²⁶ De Langen, F.H.T. (2012) Positioning the OER Business Model for Open Education. European Journal of Open, Distance and E-Learning. Retrieved from <http://www.eurodl.org/?article=483>

²⁷ Butcher, N. (2011). A Basic Guide to Open Educational Resources (OER), the Commonwealth of Learning.

²⁸ Kanwar, A., Kodhandaraman, B., and Umar, A. (2010). Toward Sustainable Open Education Resources: A Perspective from the Global South. *The Amer. Jnl. of Distance Education*, 24:65–80, 2010

²⁹ De Langen, F.H.T. (2012) Positioning the OER Business Model for Open Education. European Journal of Open, Distance and E-Learning. Retrieved from <http://www.eurodl.org/?article=483>

³⁰ Bacsich, P., Phillips, B., and Bristow, S.F. (2011). Learner Use of Online Educational Resources for Learning (LUOERL) – Final report. Higher Education Academy.

³¹ Kanwar, A., Kodhandaraman, B., and Umar, A. (2010). Toward Sustainable Open Education Resources: A Perspective From the Global South. *The Amer. Jnl. of Distance Education*, 24:65–80, 2010

³² Wired Academic. (2011). Triple Jump: Khan Academy's Unique Users Grow 309% to 3.5 Million. Retrieved from <http://www.wiredacademic.com/2011/10/triple-jump-khan-academys-unique-users-grow-309-to-3-5-million/>

³³ <http://ilearnproject.com/digital-learning/catalog-of-innovation/khan-academy/>

structured processes that build capacity to design and deliver high quality education programmes without increasing cost.³⁴

Furthermore, as Butcher (2010) explains, the principle of allowing adaptation of materials provides one mechanism amongst many for constructing roles for learners as active participants in educational processes, who learn best by doing and creating, not by passively reading and absorbing. Content licences that encourage activity and creation by learners through re-use and adaptation of that content can make a significant contribution to creating more effective learning environments.³⁵

At the institutional level, it has been argued that the transparency provided by OER (where resources produced by staff are shared openly) places social pressure on institutions and teaching staff to increase quality, allows them to better coordinate curricula, and provides resources for students' learning and for academic planning. Openly licensed educational materials are recognized for their potential to contribute to improving the quality, accessibility, and effectiveness of education, while serving to restore a core function of education: sharing knowledge.³⁶ Creating collaborative and open learning environments, and open distribution means teachers are encouraged to enhance the quality of materials, use the input from outside the institutions for enhancement of materials.³⁷

Particularly in dealing with large classes – a phenomenon facing many higher education institutions and schools as demand for access to education increases – it is maintained that teaching staff can harness OER to facilitate more effective teaching and learning in ways that save time and that enable students to take greater control of their own learning by engaging more with core resources in their own time and at their own pace. This freedom to modify also provides an unprecedented opportunity to adapt curriculum to a far greater diversity of learners who would otherwise face barriers to learning due to large class sizes, language, cultural conventions, or disabilities. Freed from being the primary deliverers of content, teaching staff are able to use their time more strategically to nurture meaningful engagement and debate and to reflect upon their own curriculum and pedagogic assumptions and practice with a view to critical reflexive practice. Face-to-face time with students is then better used to support engagement and to nurture discussion, debate, and practical application, or to support student research activities, thereby providing students with tools to advance their own understandings.³⁸

Another notable value of openness, particularly with regard to open access publications is that it enables access to the widest possible audience. For example, Kansa and Ashley (2005, in Downes, 2007), point to statistics showing that only 27 percent of research papers are published, and only five percent of research shared. The value of research data, they argue, increases ten times on openness. Furthermore, the Open Citation Project claims that articles from open publication are cited more frequently. There are multiple benefits for stakeholders: for readers, open access grants enable access to an entire body of literature; for publishers, it guarantees the widest dissemination

³⁴ Butcher, N. (2011). A Basic Guide to Open Educational Resources (OER). UNESCO and Commonwealth of Learning. Retrieved from <http://www.col.org/resources/publications/Pages/detail.aspx?PID=357>

³⁵ Butcher, N. (2010) ICT, Education, Development and the Knowledge Society. Retrieved from [http://www.gesci.org/assets/files/ICT,%20Education,%20Development,%20and%20the%20Knowledge%20Society\(1\).pdf](http://www.gesci.org/assets/files/ICT,%20Education,%20Development,%20and%20the%20Knowledge%20Society(1).pdf)

³⁶ Butcher, N and Hoosen, S. (in press). In (eds.) Hornsby D.J., Osman R, and De Matos Ala J. *Teaching Large Classes: Interdisciplinary Perspectives for Quality Tertiary Education*. Wits University Press.

³⁷ Helsdingen, A.; Janssen, B.; Schuwer, S. (2010). Business Models in OER, a Contingency Approach. In Open ED 2010 Proceedings. Barcelona: UOC, OU, BYU. Retrieved from <http://hdl.handle.net/10609/5039>

³⁸ Butcher, N and Hoosen, S. (in press). In (eds.) Hornsby D.J., Osman R, and De Matos Ala J. *Teaching Large Classes: Interdisciplinary Perspectives for Quality Tertiary Education*. Wits University Press.

of the articles they publish; funding agencies obtain the highest impact for their investment; and universities obtain increased visibility for their scholarship.³⁹

In developing curricula and learning resources, academics and teachers have always tended to engage with what are already available – often prescribing existing textbooks, building on previous iterations of a course taught by predecessors or colleagues, and creating reading lists of published articles. Even in distance education institutions, which have a long history of materials development, it is arguably a rare occurrence to develop completely new materials with no reference to what already exists. Because OER removes restrictions around copying and adapting resources, it is claimed that it can reduce the cost of accessing educational materials. These can then be used to supplement and enrich courses, which is particularly useful when there are large course cohorts. In many systems, royalty payments for text books and other educational materials constitute a significant proportion of the overall cost, while processes of procuring permission to use copyrighted material are also regarded as very time-consuming and expensive. Even where teaching staff produce new materials, their ability to draw inspiration and ideas from other people's openly accessible teaching materials often serves to increase quality without adding cost.⁴⁰. Furthermore, since course development is so resource-intensive, OER can help developing countries save both course-authoring time and money.⁴¹

Thus, in a context where education systems are facing several significant challenges globally, The OER movement has emerged as an educational phenomenon that – at least according to its adherents – has significant potential to contributing to tackling these challenges. As can be seen from the above, a key argument put forward by those who have written about the potential benefits of OER relates to its potential for saving cost or, at least, creating significant economic efficiencies. However, there has – to date – been limited presentation of concrete data to back up this assertion, which reduces the effectiveness of such arguments and opens the OER movement to justified academic criticism. As a first step towards resolving this, the remainder of this paper aims to review the literature in order to sift out what – substantively – has been learned over the past ten years about the *actual* economic benefits, if any, of applying open licenses to educational materials. It focuses on two specific aspects of OER: (1) course materials design and development and (2) the educational textbook market. It presents a brief review of literature and then explores in more detail a few case studies that provide greater insight into the potential economics of OER. While this paper, which is based exclusively on desk research, is not able to provide conclusive evidence about the economic potential or otherwise of OER, it does indicate some clear trends and points the way to further, more detailed research that is now needed.

³⁹ Downes, S. (2007). Models for Sustainable Open Educational Resources. *Interdisciplinary Journal of Knowledge and Learning Objects*, Vol 3. Retrieved from <http://ijklo.org/Volume3/JKLOv3p029-044Downes.pdf>

⁴⁰ Butcher, N and Hoosen, S. (in press). In (eds.) Hornsby D.J., Osman R, and De Matos Ala J. *Teaching Large Classes: Interdisciplinary Perspectives for Quality Tertiary Education*. Wits University Press.

⁴¹ Kanwar, A., Kodhandaraman, B., and Umar, A. (2010). Toward Sustainable Open Education Resources: A Perspective From the Global South. *The Amer. Jnl. of Distance Education*, 24:65–80, 2010

2 The economics of OER

2.1 Introduction

The cost-effectiveness of OER is often noted as one of the advantages of adopting an open licensing model, although it has been separately argued that there is little substantiated evidence to support this notion. Many existing OER services were established with ‘once-off’ initial funding and based on an altruistic notion of opening resources worldwide and issues of sustainability, particularly financial sustainability has recently generated much discussion.⁴² Analysing this more carefully is thus particularly important if the OER movement wishes to have a lasting and sustainable effect on educational practices.

Many of the most high-profile OER initiatives historically have been donor driven. Often, as donor support is withdrawn, the initiative shuts down or reduces its operations significantly. An illustration of this was the discontinuation of Utah State University OCW which received multiple rounds of funding from the William and Flora Hewlett Foundation, as well as a once-off appropriation from the Utah state legislature as part of the Utah OCW Alliance. However, despite having published over 84 USU courses over four years, the project is no longer operating due to lack of funding. It has been argued that this was due to OCW at USU not being integrated with university structures.⁴³ Although there has been significant diversification of sources of funding for OER initiatives in the past two years, many OER projects remain predominantly donor-funded (although there is some growth of institutional funding, particularly amongst early adopting institutions), with major funders including the William and Flora Hewlett Foundation, the Bill and Melinda Gates Foundation, the Andrew W Mellon Foundation, and the Shuttleworth Foundation. Whilst Foundation funding has been an essential component of establishing the OER field, it has been argued that such funding cannot be relied on for on-going development, operations, and sustainability, with many OER initiatives struggling to establish and transition to a future independent of Foundation funding.⁴⁴

Despite this, there are several arguments which support the economic viability of adopting OER. Hall (2010) notes that a distinction which is important to the knowledge economy is that between private returns on investments that can be directed to designated beneficiaries (such as shareholders in publishing companies, or scientific societies that retain surpluses from publishing) and public, or open, returns that have wider and far more diffuse benefits. It has been argued that returns on investment in the production of knowledge are likely to have far more substantial ‘open’ benefits than private advantages. This arises from the characteristic of non-excludability – the difficulty of keeping knowledge to yourself – and the diminishing value of your asset as you try to do so. This is also an essential aspect of the lifecycle of scholarly knowledge: once something is discovered or reinterpreted, the whole point is to get it published and to reap the benefit of peers attributing the insight to you by means of the conventions of citation. These benefits are supported by the fact that knowledge is not exhausted through use and cumulative effects.⁴⁵

⁴² Belshaw, D. (2012). Approaches and Models. In Open Educational resources infoKit. Retrieved from <https://openeducationalresources.pbworks.com/w/page/24838043/Approaches%20and%20models>

⁴³ Members of the IPT 692R class at BYU. (2009). Open Educational Resources Policy Background. Retrieved from http://education.byu.edu/a2k/documents/oer_policy_backgrounder.pdf

⁴⁴ Stacey, P. (2010). Foundation Funded OER vs. Tax Payer Funded OER – A Tale of Two Mandates. Retrieved from: <http://edtechfrontier.com/2010/10/26/foundation-funded-oer-vs-tax-payer-funded-oer-a-tale-of-two-mandates/>

⁴⁵ Hall, M. (2010). Minerva’s Owl. A response to John Houghton and Charles Oppenheim’s ‘The economic implications of alternative publishing models, *Prometheus*, Vol 28(1); 61-71

Another compelling motivation for the economic benefit of OER is that it needs to be considered in the context of spiralling education costs and the need to make education more accessible and affordable at all levels. It has been argued that, if education is paid for the public, then research and content produced with those public funds should be publicly available. This has resulted in calls for governments to institute a policy that ‘all publicly funded resources are openly licensed resources’.⁴⁶ This is also seen in debates around the access to results of academic research, much of which is funded by the taxpayer public funds.

Yet another convincing argument, with some substantiated evidence, is the indirect income generation potential of OER. OER has the potential to generate indirect revenue by marketing institutions’ reputation and the quality of their materials, which may convince students to enrol in fee paying courses. Studies at MIT indicate that 35% of freshmen aware of OCW before deciding to attend MIT were influenced by it and by its availability (Carson 2006, 2009).⁴⁷ In another example, the OpenLearn Initiative at Open University in the United Kingdom (OUUK) has approximately 200,000 course enrolments and 130,000 students each year, of whom, in a two year period, 7,800 have come from people who used the ‘enrol now’ button in the OUUK’s course samples to convert to a fully paid enrolment. Thus approximately 1.95% of their enrolments in a two-year period come through conversions from free OCW users into paid course enrolments. Approximately 33% of those conversions were people who were new to the OUUK system, meaning that around 1,280 new paying students converted through free course samples each year. Similarly, the Open University of the Netherlands (OUNL) reported that 18% of OCW users were ‘inspired to purchase an academic course’ based on their interactions with OUNL OCW (Eshuis, 2009).⁴⁸

Another approach to generate revenue is to integrate revenue-generating activities in open materials, such as the case with MIT where all reading materials have a link to a retail website that sponsors MIT OCW for each sale it thus makes. Similarly, Flatworldknowledge presents its fee-based products next to free content. In the Netherlands, Wikiwijs has a different strategy in that it offers access to open and closed content, thus generating interest from vendors/ distributors of closed educational materials. This interest results in collaborations with commercial parties and may thus generate revenue. The University of California-Irvine presents information on whether the free course can also be taken for a credit and thus directs learners who are interested in accreditation to their fee-based programme. They also target their marketing of fee-based courses at specific communities that have emerged around an open collection.⁴⁹ Thus in these cases, OER brings direct commercial benefits, because the sharing of materials online raises an institution’s ‘visibility’ on the Internet, while also providing students more opportunities to investigate the quality of the educational experience they will receive. As students in both developed and developing countries are relying increasingly heavily on using the Internet to research their educational options, sharing of OER may well become an increasingly important marketing tool for institutions, and there is some initial evidence that this translates directly into new business for institutions.⁵⁰

Many proponents of OER advocate that a key benefit of open content is that it is ‘free’ (i.e. it does not cost anything to download – leaving aside costs of bandwidth). This is literally true: by definition, open content can be shared with others without asking permission and without paying licence fees.

⁴⁶ Wiley, D., Green, C., and Soares, L. (2012). Dramatically Bringing Down the Cost of Education with OER - How Open Education Resources Unlock the Door to Free Learning. Educause

⁴⁷ Bacsich, P., Phillips, B., and Bristow, S.F. (2011). Learner Use of Online Educational Resources for Learning (LUOERL) – Final report. Higher Education Academy.

⁴⁸ Johansen, J., and Wiley, D. A. (2010). Sustainable Model for OpenCourseWare Development. *Educational Technology Research & Development*, Vol 59(3): 369-382

⁴⁹ Helsdingen, A.; Janssen, B.; Schuwer, S. (2010). Business Models in OER, a Contingency Approach. In Open ED 2010 Proceedings. Barcelona: UOC, OU, BYU. Retrieved from <http://hdl.handle.net/10609/5039>

⁵⁰ Butcher, N. (2011). A Basic Guide to Open Educational Resources (OER), the Commonwealth of Learning.

However, simplistic assertions that OER is free – and by extension that use of OER will cut costs of educational delivery – mask some important cost considerations.⁵¹ Even though a resource may be free for the consumer, it does not follow that the resource is free in the sense that it nonetheless costs something in funding or services to create and distribute a resource. In converting material to OER, costs include factors such as the labour to convert courses to an OCW format, scrubbing of content to remove copyrighted material, using or buying necessary hardware and software, and providing other supplies. If offering OCW courses attracts new paid enrolments, it is argued that the profit from those additional enrolments could offset the expense of offering OCW courses, making the programme self-sustainable.⁵²

Nevertheless, it has also been argued that OER can reduce costs through more cooperation, collaboration, and partnerships. For organizations that rely partly on contributions from individuals, such as Wikieducator, the fixed costs are very low. Usually, a staff of two can manage day-to-day business. Variable costs are usually lower for OER, because most organizations do not provide any services to their customers other than the content. Thus, it requires only updating of materials and maintaining the website. In community based initiatives like Wikieducator and Wikiwijs, the costs for updating, maintaining, reviewing and adapting materials, as well as providing feedback, coaching and support, is distributed among all individual contributors. The only variable cost left for the distributor is cost for data-storage, website support and maintenance.⁵³

Scrimgeour (2009) argues that it is vital to compare the cost of producing OER and proprietary content on the same basis. In particular, educators who produce OER may not be ‘in it for the money’, but they are usually paid, as are the editors, formatters, promoters, and reviewers. The difference is that the cost arises at source and is only incurred once, whereas proprietary content is paid for through the mechanism of sales. Furthermore, the true cost difference lies in the relative cost structures and profit/loss of the publishers and distributors, which may or may not represent value for money in terms of efficiency, quality, and awareness. The real concern of publishers is breach of security, since it denies them the income from sales, while continuing to expose them to the costs of production.⁵⁴

A key way to address funding issues is acknowledging the benefits of integrating OER practices with any content/material development process (as has been done at the Open University). Sourcing existing OER as part of the process of investing in high quality learning resources that meet curriculum needs can potentially save costs. Given this potential, it is worth exploring the issue of course design in more detail in order to see what the actual economic value might be.

2.2 OER and Course Design

2.2.1 The value of investing in course design

ODL models have long asserted the economic value of investing in design and development of effective courses and course materials. This is premised on an assumption that it is possible to shift

⁵¹ Butcher, N. (2011). A Basic Guide to Open Educational Resources (OER), the Commonwealth of Learning.

⁵² Johansen, J., and Wiley, D. A. (2010). Sustainable Model for OpenCourseWare Development. *Educational Technology Research & Development*, Vol 59(3): 369-382

⁵³ Helsdingen, A.; Janssen, B.; Schuwer, S. (2010). Business Models in OER, a Contingency Approach. In Open ED 2010 Proceedings. Barcelona: UOC, OU, BYU. Retrieved from <http://hdl.handle.net/10609/5039>

⁵⁴ Scrimgeour, A. (2009). Asymmetrical OER Country Problems and Needs. Educational Technology Debate – Exploring ICT and Learning in Developing Countries. Retrieved from <https://edutechdebate.org/creating-electronic-educational-content/asymmetrical-oer-country-problems-and-needs/>

patterns of expenditure to achieve economies of scale by amortizing identified costs (particularly these investments in course design and development, but also in effective administrative systems) over time and large student numbers. Several distance education providers have already demonstrated clearly that, when this is done well, it can achieve significant economic gains in the cost of delivering education to large numbers of students.

Added to this, though, in the context of teaching large classes as demands for education grows, several authors provide suggestions that teachers can adopt to reduce the negative features of large classes. Most commonly, there is a call for multiple teaching strategies to accommodate the different learning styles of students. Thus, in a lecture setting, teaching staff increasingly are required to do more than just write up lecture notes and walk into class. They should first be aware of the limitations of large classes, and then plan their teaching and learning activities to compensate for those limitations.⁵⁵ This is particularly important in developing world contexts, where the lack of equipment, teaching materials, rising student enrolments, lack of academics and poor infrastructure may result in an over-reliance on the lecture method. Improved instructional technology, and particularly the development of the Internet and the Web, has provided opportunities for academics to use these technologies to improve teaching and learning. The proliferation of available resources makes it possible to shift communication of content to a wider range of methods, offering students multiple modes of learning rather than being limited to lectures. Given the proliferation of OER and ICT infrastructure, particularly on university campuses, use of these methods is increasingly affordable to implement and accessible to students, and provides many alternatives for use in designing creative teaching and learning environments that can offset the problems associated with growing student enrolments.

Furthermore, a core function of a university is effective teaching and learning, which requires appropriate investment in curriculum and course design and materials development, as well as on-going evaluation and regular renewal. At the same time, teaching staff often need to deal with ever-increasing class sizes and a growing diversity of learners. Therefore, institutions need to make better use of the resources they have. Given this reality, the primary role of teaching staff should not necessarily be delivery of content in the form of lectures: this can be managed more effectively by the development and provision of learning resources.⁵⁶

This makes the concept of resource-based learning of particular interest. Despite this, debates over OER have typically made little reference to the concept of resource-based learning until recently. This may be because the emphasis in most global OER discussion has been on the sharing and licensing of existing materials, a significant proportion of which has included simply sharing lecture notes and PowerPoint presentations used in face-to-face lectures.

Resource based learning (RBL) refers to courses, or part of courses, with a particular style of instruction in which students primarily learn from:

specially prepared teaching materials. That is, the teaching will have been largely pre-planned, pre-recorded and pre-packaged. It will be presented in instructional texts, audiotapes, videotapes, assignment exercises. (Rowntree, 1986: 11).⁵⁷

Resource-based learning involves communication of curriculum between students and educators through *use of resources* (instructionally designed and otherwise) that harness different media (such

⁵⁵ Arbour, B. K., Karras, A., and Lee, E., (2010). Large Lecture Sections: An Experiment Test of Their Effectiveness (February 1, 2010). APSA 2010 Teaching & Learning Conference Paper. Retrieved March 5, 2011 from

<http://ssrn.com/abstract=1546252>

⁵⁶ Butcher, N and Hoosen, S. (in press). In (eds.) Hornsby D.J., Osman R, and De Matos Ala J. *Teaching Large Classes: Interdisciplinary Perspectives for Quality Tertiary Education*. Wits University Press.

⁵⁷ McKeachie, W.K. (1991). Resource-based Learning. Retrieved from <http://www2.glos.ac.uk/gdn/gold/ch6.htm>

as text, videos, simulations, and animations) as necessary. Resource-based learning strategies can be integrated into any educational programme, using any mix of contact and distance education strategies. The concept is based on the principle that educators should select, from the full range of educational provision, those resources and methods most appropriate to the context in which they are providing education.

Well-designed learning resources typically require much greater individual engagement by students with information, ideas, and content than is possible in a large-scale contact lecture. Teaching staff can harness OER to facilitate more effective teaching and learning in ways that save time and that enable students to take greater control of their own learning – engaging more with core resources in their own time and at their own pace. Open licences that encourage activity and creation by students through re-use and adaptation of content can make a significant contribution to creating more effective learning environments. This freedom to modify also provides an unprecedented opportunity to adapt curriculum to a far greater diversity of learners who would otherwise face barriers to learning due to large class sizes, language, cultural conventions, or disabilities. Freed from being the primary deliverers of content, teaching staff can then use their time more strategically to nurture meaningful engagement and debate and to reflect upon their own curriculum and pedagogic assumptions and practice with a view to critical reflexive practice. Face-to-face time with students can then be better used to support engagement and to nurture discussion, debate, and practical application, or to support student research activities, thereby providing students with tools to advance their own understandings.⁵⁸

OER has further potential to build capacity by providing institutions and teaching staff access, at relatively low cost, to the means to create and adapt high quality teaching and learning materials. This can be harnessed to develop competence in producing such materials and carrying out the necessary instructional design to integrate such materials into high quality programmes of learning.

2.2.2 Costing for course design and development

There have been several attempts to provide estimates of the costs involved in course design and development. For example, Boettcher (2006) notes that, based on much anecdotal evidence plus her real experience over the last 10-15 years of building computer-based material, it takes an average of about 18 hours (with a range between 5-23 hours) - of faculty time - to create an hour of instruction that is on the Web. This refers to instruction that can be delivered independent of an expert faculty member.

Swift (1996 in Butcher and Roberts 2004) estimated the design time for courses at first year university level as follows:

Table 1 Time taken to design one notional hour of student learning time⁵⁹

Media	Hours
Print	20-100 hours
Audio	20 – 100 hours
Video	50 – 200 hours
Computer-based instruction	200 – 300 hours
Experiments	200 – 300 hours

⁵⁸ Butcher, N and Hoosen, S. (in press). In (eds.) Hornsby D.J., Osman R, and De Matos Ala J. *Teaching Large Classes: Interdisciplinary Perspectives for Quality Tertiary Education*. Wits University Press.

⁵⁹ Butcher, N. & Roberts, N. (2004). Costs, effectiveness, efficiency: a guide for sound investment, in H. Perraton & H. Lentell (EDs) *Policy for open and distance learning*. London: Routledge. 224-245.

Similarly, Bryan Chapman of Brandon-Hall listed these average design times to create one-hour of training:

*Table 2 Average design times for one hour of training*⁶⁰

	Average hours
Instructor-Led Training (ILT) , including design, lesson plans, handouts, PowerPoint slides, etc. (Chapman, 2007).	34
PowerPoint to E-Learning Conversion (Chapman, 2006a, p20).	33
Standard e-learning , which includes presentation, audio, some video, test questions, and 20% interactivity (Chapman, 2006a, p20)	22
3rd party courseware . Time it takes for online learning publishers to design, create, test and package 3 rd party courseware (Private study by Bryan Chapman)	345
Simulations from scratch. Creating highly interactive content (Chapman, 2006b)	750

Note that these are ‘averages’. Thus, any one programme might take as little as one hour or up to 500 hours depending on the person’s design skills and knowledge of the subject, amount of material to be converted, and the type of transformation needed.⁶¹

The University of South Africa note that the staff time required to produce a course of a given number of learning hours cannot be exactly specified. Mays (2011) calculates this based on ratios of staff hours to learning hours for the development of a module.

*Table 3 Staff hours to develop a module*⁶²

Activity	Time
Course design preparation	8 hours
Curriculum design	250 hours
Compiling of study material	1,300 hours
Editing (if done by academic department)	50 hours
Translation (if done by academic department)	300 hours

In this instance, many modules use a prescribed text book and ‘wrap around’ study guide (a guide that contains little subject content, but provides students with a learning structure that assists them in working through the prescribed book). For such modules, the number of staff hours allocated to compiling the study material could be halved (650 hours instead of 1 300 hours).⁶³

Estimates for course design tend to vary across a number of variables such as course structure (costs for online courses differ from print based distance education or face to face teaching), tools that will be used, learning methods and the availability of existing content.⁶⁴ In addition, staffing costs may be much lower and technology provision and access costs much higher in developing countries than in

⁶⁰ Estimating Costs and Time in Instructional Design. (2010). Retrieved from <http://www.nwlink.com/~donclark/hrd/costs.html>

⁶¹ Estimating Costs and Time in Instructional Design. (2010). Retrieved from <http://www.nwlink.com/~donclark/hrd/costs.html>

⁶² Mays, T. (2011). *Programme modelling: a Nadeosa investigation into the cost and human resource implications for different models of ODL provision – draft conference version*. Nadeosa and Saide. Johannesburg.

⁶³ Mays, T. (2011). *Programme modelling: a Nadeosa investigation into the cost and human resource implications for different models of ODL provision – draft conference version*. Nadeosa and Saide. Johannesburg.

⁶⁴ Johansen, J., and Wiley, D. A. (2010). Sustainable Model for OpenCourseWare Development. *Educational Technology Research & Development*, Vol 59(3): 369-382

developed countries. In face to face learning environments, course materials may be in an outline form as it is expected that the instructors will mediate the curriculum and fill in the blanks during contact hours. In distance education or e-learning environments, usually all the content is provided and suitable for self-study, and hence may have more upfront costs when developing materials.

As ICT has become an increasingly important element of the educational landscape, course development costs have typically increased over time, as video and computer-computer-based multimedia materials – while adding potential educational value – are significantly more expensive to produce than equivalent printed materials. As interactive content use increases in material development, more time is required to develop content (and often more specialists).⁶⁵ ⁶⁶ However, as faculty become more experienced and comfortable with the available tools, the number of hours required may go down. Efficiency in resource development can be enhanced by the availability of digital resources, particularly if these are open. Furthermore, collaborating or partnering with a faculty or multiple faculties from different institutions working in the same content area, a larger, richer database of content can be developed more efficiently and with broader use and importantly removes duplication of efforts.⁶⁷

The cost of materials acquisition has also increased as a consequence of developments in pedagogical approaches, instructional design improvements, and the introduction of outcomes-based learning. This is because many modern printed materials typically tend to be workbooks, rather than traditional textbooks. This means that, once a single student has used the book, it cannot be used by other learners.⁶⁸ However, practitioners have cautioned against comparative costing, particularly using analyses in one jurisdiction to draw inferences about costs in another⁶⁹

In some examples of costs involved in creating online resources, MIT OCW Evaluation Findings report (MIT OpenCourseWare, 2006) states MIT OCW's cost to open a course as ranging from \$10,000–\$15,000 per non-video-based course to \$30,000 per video-based course. Utah State University (USU) reported that their cost to open one course was approximately \$5,000 (Wiley, 2007). USU's expenses came primarily from the labour costs of the personnel working on USU's open publishing initiative. USU's open publishing team consisted of a full-time Director, two half-time graduate students, and three half-time undergraduate students. USU also opened some courses with no direct cost by having students and graduate students publish courses as class projects.⁷⁰

It is worthwhile to note that the costs of creating courses are just one aspect in enhancing education, and several other factors need to be considered to ensure their sustainability. This includes the cost of training, supporting and mentoring staff to use a resource, creating reliable assessment procedures, effectively managing students and keeping content up to date and relevant. Furthermore, when harnessing OER, consideration needs to be made for dealing with copyright licensing and associate costs such as ICT infrastructure (for authoring and content-sharing purposes), bandwidth, running content development workshops and meetings, and so on. As institutions make

⁶⁵ Boettcher, J. V. (2006). How Much Does It Cost to Develop a Distance Learning Course? It All Depends.... Retrieved from <http://www.designingforlearning.info/services/writing/dlmay.htm>

⁶⁶ Mays, T. (2011). *Programme modelling: a Nadeosa investigation into the cost and human resource implications for different models of ODL provision – draft conference version*. Nadeosa and Saide. Johannesburg.

⁶⁷ Boettcher, J. V. (2006). How Much Does It Cost to Develop a Distance Learning Course? It All Depends.... Retrieved from <http://www.designingforlearning.info/services/writing/dlmay.htm>

⁶⁸ Johansen, J., and Wiley, D. A. (2010). Sustainable Model for OpenCourseWare Development. *Educational Technology Research & Development*, Vol 59(3): 369-382

⁶⁹ Mays, T. (2011). *Programme modelling: a Nadeosa investigation into the cost and human resource implications for different models of ODL provision – draft conference version*. Nadeosa and Saide. Johannesburg.

⁷⁰ Johansen, J., and Wiley, D. A. (2010). Sustainable Model for OpenCourseWare Development. *Educational Technology Research & Development*, Vol 59(3): 369-382

strategic decisions to increase their levels of investment in design and development of better educational programmes, the most cost-effective way to do this is to embrace open licensing environments and harness existing OER.⁷¹ Nevertheless, it is important to note that the costs of design are incurred regardless of the number of students who study the course. Low unit costs then follow only if very large numbers of students study it successfully and the person power devoted to ‘presenting’ the course is substantially lower than in face-to-face settings. This provides a very strong argument in favour of harnessing OER in an effort to manage the cost of course design and development, as is highlighted in the case study below.

2.2.3 A Case Study from Guyana

COL the Commonwealth Secretariat (ComSec), and Microsoft recently supported the development of an ICT Professional Development Strategy for Teachers in Guyana, built around the UNESCO ICT Competence Framework for Teachers (CFT).⁷² Part of the process involved creating a set of training modules for teachers to help them move through basic technology literacy to more advanced usage of technology. This was done in recognition that, if ICT are to become part of the way in which teachers teach, learners learn and school managers operate, the teacher education curriculum (of both pre-and in-service teachers) should reflect the important roles that ICT might play in a typical school. Thus, at a series of meetings with the National Centre for Educational Resource Development (NCERD) and key players from the Guyanese education system such as staff of Cyril Potter College of Education (CPCE) and the University of Guyana (UG), overall requirements for these modules were defined. This can be summarized as follows:

- 1) A pre-assessment tool was required, in order to assess whether or not participants have basic ICT skills to be able to participate in the first module. If not, students will be provided a remedial training module to learn basic ICT skills (use of mouse, keyboard, etc.).
- 2) The Information Literacy module/s was expected to last approximately 60-90 hours, comprising a blend of face-to-face interaction and self-study. It draws on the module designs already prepared by NCERD and CPCE, but takes into account the new course descriptions prepared for a revised teacher education programme in Guyana. Development of this module was based on the requirements of the UNESCO ICT CFT, and draws in – to the greatest extent possible – existing materials in order to keep the course design cost-effective and globally relevant.
- 3) The advanced ‘Knowledge Deepening’ module, also based on the requirements of the UNESCO ICT CFT, would last approximately 90 hours, and comprise a blend of face-to-face interaction and self-study.

Given the limits of available capacity within the relevant Guyanese structure, draft modules were developed by a consultant contracted by COL and ComSec. The innovative curriculum and materials development process used in Guyana involved the following:

- 1) Reviewing the existing curriculum, that involved examining the ICT in Education curriculum at CPCE and UG. It was recognized that the curricula and associated materials should be designed to work within the national context and mirror the conditions that teachers will find on the ground.
- 2) A curriculum programme was mapped ahead of any development phases. This was based on the UNESCO ICT CFT and included high-level objectives as well as specific unit outcomes, proposed content, and teaching methodology. This process allowed writers to weight the different focus areas and to determine the number of hours a student should spend working on the materials.
- 3) Guided by the curriculum map, a four-person, part-time development team conducted an Internet search for potential resources relevant to the subject matter. In addition to identifying

⁷¹ Butcher, N. (2011). A Basic Guide to Open Educational Resources (OER), the Commonwealth of Learning.

⁷² See www.unesco.org/new/en/unesco/themes/icts/teacher-education/unesco-ict-competency-framework-for-teachers

OER and free resources that were closely aligned to the course direction identified by the curriculum map, the developers also determined the quality and suitability of each resource found, as well as the amount of repurposing they require. Resources that required little repurposing were selected as far as possible.

- 4) The development team constructed a set of simple user guides to set out the suggested learning pathway through the selected resources. In addition to identifying the sequence of learning events, the team also offered a suggested set of student activities. This is so that the learning process was not merely didactic in nature but calls on students to engage critically with the sourced OER. In addition teaching guidelines and a list of further reading and references for the lecturers were assembled.
- 5) The content was piloted with stakeholders in Guyana to test the assumptions of the development team. Various units of the course were deployed at CPCE, where staff reported a mostly positive experience. Initial feedback from CPCE staff and comments and suggestions from UG staff were all collected and collated to inform revisions to the course materials. During 2012, the Knowledge Deepening course will be integrated into the UG Degree Programme.
- 6) A revision phase followed so that the collected user feedback informed changes to the course. This included less emphasis on the teacher facilitation notes so that they were aimed directly at the students rather than at the lecturing staff and hence became teaching materials rather than guides. In addition the OER and free resources were downloaded onto a CD-ROM. An electronic version of the course was developed so that staff and students could choose between using the paper-based versions or the electronic CD-ROM. The latter was deemed important to eliminate the need for connectivity.

The overall cost of the development team is reflected in the table below:

Table 4 Time and Costs of developing OER (the case of Guyana ICT in Education programme)

Development Team	Time (days)	Costs (US \$)
Educational Consultant/Instructional designer/Graphic and Web designer/editor	32	\$16,624
Instructional designer 2	17	\$6,684
Instructional designer 3	19	\$7,290
Graphic and Web designer	7	\$1,453
TOTAL	76	\$32,051

According to the educational consultant who was also the main instructional designer, the Information literacy module lasts approximately 70 hours, whilst the Knowledge Deepening Model lasts approximately 90 hours. If one compares the cost of this development with the notional figures provided in the previous section, there is a clear indication that approach of building a course using existing content is significantly more cost effective. In Guyana, it took 76 days (or 608 hours) to produce 160 hours of learning (of which 80 are effectively text or print-based and 80 are computer-based instruction). The following table compares Swift's estimates of time to design one notional student hour of learning with the actual time taken to develop the Guyana materials.

Table 5 Comparing Guyana design with Swift's notional estimates

Media	Swift's notional estimate of time required to produce material equivalent to one notional hour of learning	Actual hours taken to develop one notional learning hour of material
Print	20-100 hours	3.8 hours
Computer-based instruction	200 – 300 hours	3.8 hours

However, as these estimates are for distance education course development and the Guyana courses are a blended learning design, it is possibly more useful to compare the costs with the notional estimates from Bryan Chapman. The result is no less startling.

Table 6 Comparing Guyana design with Chapman's notional estimates

Media	Chapman's notional estimate of time required to produce material equivalent to one notional hour of learning	Actual hours taken to develop one notional learning hour of material
Instructor-Led Training (ILT), including design, lesson plans, handouts, PowerPoint slides, etc.	34 hours	3.8 hours
Standard e-learning, which includes presentation, audio, some video, test questions, and 20% interactivity	22 hours	3.8 hours

What these costs do not reflect is an even greater cost saving as the time reflected also includes the development of content based on international examples (i.e. not Guyana specific and containing more generic content). Thus the outcomes of the project were eight versions of content. These are:

- Guyana Pre-service Information Literacy module (print version and CD version)
- Guyana In-service Information Literacy module (print version and CD version)
- Guyana Pre-service Knowledge Deepening Module (print version and CD version)
- Guyana In-Service Knowledge Deepening Module (print version and CD version)
- International Pre-service Information Literacy module (print version and CD version)
- International In-service Information Literacy module (print version and CD version)
- International Pre-service Knowledge Deepening Module (print version and CD version)
- International In-Service Knowledge Deepening Module (print version and CD version)

As all of this content is being shared under an open licence, the potential for achieving economies of scale grows further as and where it is used by other institutions. Already, the material is being adapted for use in countries as diverse as St Vincent and the Grenadines and Indonesia, where it is being re-deployed with marginal re-development time required to contextualize the materials effectively.

It is important to note that, in this case, a key contributor to cost reduction was the fact that costs were reduced because the leader of the team was multi-skilled and thus able to serve several functions. The education consultant in this instance served multiple roles: as an Instructional designer, Graphic and Web designer, workshop facilitator and a general editor. Traditionally, such

functions have tended to be spread across multiple people, raising costs. This kind of multi-tasking has been facilitated by the growing access to content development tools provided by ICT, but does also suggest that effective economic use of OER for course design and development does require highly-skilled designers to work successfully.

Thus, while curriculum revision and content creation has often been considered a time-consuming and expensive process, the creation of an ICT-friendly component for the teacher education curriculum in Guyana was achieved at a relatively low cost by using an existing curriculum framework (the UNESCO ICT CFT) and repurposing OER.

2.3 OER and Textbook Publishing

The increasing demand for access to quality education at school level and rising higher education enrolments also calls for an increasing demand for educational resources, particularly textbooks. However, in addition to the rising cost of education, textbook prices are also soaring. For example, in the US, the average undergraduate student spends over \$1,168 on books and materials each year.⁷³ In addition, the average retail cost of a market-leading new textbook (based on a sample of 10 high-enrolment college courses) is \$176 and many cost more than \$200 mark. This is more than four times the rate of inflation for the past two decades.⁷⁴ This has caused the overall price of higher education to increase significantly and pose serious financial difficulties for students and parents. Notably, this affects mainly students from lower socio economic backgrounds,⁷⁵ and the problem is especially severe at community colleges, where textbook costs often rival the cost of tuition. A survey conducted by the Student Public Interest Research Groups (PIRGs) in 2011 found that 7 in 10 respondents had not purchased one or more required text due to cost, even though 78% believed it could hurt their academic performance. Furthermore, a 2009 report by Public Agenda found that 60% of college dropouts said that textbook costs had affected them financially.⁷⁶

Publishers have been criticized for producing books that are too long (faculty use only a small portion of the text), bundling (forcing students to buy not just the book but other resources that create higher prices and may make the book harder to resell), and for publishing revisions more frequently than needed (GAO, 2005). Faculty have been criticized for assigning expensive textbooks when other alternatives are available, and in many instances professors assigning the textbooks are not even aware of the prices of these books.⁷⁷

Concerns about high textbook costs are not limited to the United States. Other countries also appear to be questioning the high costs of textbooks. For example, in South Africa, the publishing industry receives approximately R1.5 billion each year from the basic education department's textbook orders. The ruling party is considering establishing a state owned publishing enterprise in recognition that the acquisition of textbooks from private publishers is 'neither cost-effective nor efficient'.⁷⁸

⁷³ College Board Advocacy and Policy Center. (2011). Trends in College Pricing 2011. New York: College Board. Retrieved from <http://trends.collegeboard.org/>

⁷⁴ Student Public Interest Research Group. (2010, October 21). *Make Textbooks Affordable*. Retrieved from Student PIRGS: Make Textbooks Affordable: www.studentpirgs.org

⁷⁵ Koch, J.V. (2006). An Economic Analysis of Textbook Pricing and textbook Markets. Retrieved from <http://www2.ed.gov/about/bdscomm/list/acsfa/txtbkpres/kochpresent.pdf>

⁷⁶ Allen, N. (2011). Affordable Textbooks for Washington's Students: A Cost Analysis of the Open Course Library. Retrieved from <http://www.studentpirgs.org/textbooks/documents/affordabletextbooks-for-wa-students.pdf>.

⁷⁷ Hilton, J.L., and Wiley, D.A. (2010) A sustainable future for open textbooks? The Flat World Knowledge story. *First Monday*, Vol 15, No.8

⁷⁸ John, V. (2012). Nationalisation of textbooks in our lifetime, says ANC. *Mail and Guardian Online*, 28 May 2011. Retrieved from <http://mg.co.za/article/2012-05-28-textbook-publishing>

The following detailed analysis from Brazil further illustrates the growing economic cost of textbooks that have all-rights reserved copyright licences.

2.3.1 The cost of textbooks in Brazil

Brazil has recognized the high costs of textbooks and the OER movement in that country is seeking to tackle this issue. Brazil has made remarkable steps in the OER field, including signing an international declaration on open government, senate-approved legislation on access to governmental information, local legislation that gives preference to free software for governmental use in states like Rio de Janeiro, and discussions about implementing policy related to OER at different governmental levels. One of the primary tenets that moves OER forward in Brazil, including providing an open model for textbooks, is that publicly-funded educational materials, both teaching materials and research output, should be considered public goods and made available under international definitions of OER.⁷⁹

A key driver of these developments is that the current model of textbook costs places them out of the reach of most Brazilians. In 2008, the Brazilian Institute for Consumer Protection (IDEC) calculated the costs of acquiring material for disciplines such as law, economics and business, focusing on the first college year at some public and private teaching institutions. They found that the average cost in public institutions was R\$2,578 and R\$3,908 in private ones. Strikingly, almost a third of the required books were out of print, so these were not incorporated in the average cost. It discovered that, in institutional libraries, the average collection numbered no more than six books per 100 students at public institutions and no more than eight at private ones.

Similar results were showed in a study conducted by the Research Group for Public Policies for Access to Information (GPOPAI) at University of São Paulo (USP), which evaluated the cost of all professional books required in ten top courses at USP, comparing this with the average monthly income of the students' families. The conclusion was that, for 75 per cent of students, the cost of acquiring books was higher than the family's monthly income (the Brazilian monthly minimum wage was R\$465 in 2010). Again, for this study, one third of titles was out of print and thus was not included in the costs.

In response to a set of connected problems — high costs, unclear limitations on the rights of copyright holders, and increasing pressure from students under the flag 'Copying Books is a Right' — some universities issued internal resolutions adopting 10 per cent of a work as the definition of 'short extracts' acceptable for photocopying without payment. However, this stance resulted in a threat from the International Intellectual Property Alliance, which then led to revocation of such university resolutions.⁸⁰

Business associations in Brazil echoed these international threats. The Brazilian Association of Reprographic Rights (ABDR) refused to accept the universities' resolutions, began revoking licenses and suing copy-shops and began a media campaign called 'Copying Books is a Crime'. ABDR actions did not differentiate among cases where books were out of print or rare, openly licensed through Creative Commons, or even in the public domain. At the policy and legal level, ABDR have pushed for restrictive bills to enshrine their position in law, though so far without success.

⁷⁹ Rossini, C. (in press). From Apples to Legislation: OER Policy in Brazil. In Open Educational Resources (OER) and Change in Education: Reflections from Practice. Commonwealth of Learning: Vancouver

⁸⁰ Rossini, C. (in press). From Apples to Legislation: OER Policy in Brazil. In Open Educational Resources (OER) and Change in Education: Reflections from Practice. Commonwealth of Learning: Vancouver

When investigating who pays for the greater part of the production of professional and scientific textbooks adopted by Brazilian universities, the following was discovered:

- The market for professional and scientific textbooks accounts for 25 per cent of titles and 7 per cent of sale-units. This amount accounts for 20 per cent of sales in the publishing market — equivalent to R\$418,550,460 in 2006.
- Since 1960, the publishing industry (i.e., books in all forms, newspapers and magazines) is tax-exempt. In 2004, the publishing industry was granted additional benefits and freed from an obligation to make contributions such as Social Integration Programme fees and the Contribution for the Financing of Social Security. These tax and contributions exemptions, which affect both the final product and the production process (including, for instance, the paper used) are intended to reduce the final price of the product.
- These subsidies (by virtue of the tax and contribution exemptions) represented a windfall of around 30 per cent of the total sales income (between 2001 and 2006). For the sake of comparison, this subsidy was roughly double the total budget of the Brazilian Ministry of Culture over the same period.
- Taxpayer monies constitute the largest single investment source for higher education scientific and professional books in Brazil. Federal and state public universities in Brazil are free, the salaries for employees and professors come from the universities' budgets (and thus from the government), and many scholarships, including at master's and doctoral levels, are provided. Additionally, the majority of public institutions maintain their own academic publishing units, also supported by their university budgets.
- Thus, most concentration of textbooks written by professors. For instance, 86 per cent of the books in the GPOPAI sample (1,910 books adopted by 25 different courses in more than 14 institutions) were authored by full-time, employed professors from public institutions.
- Furthermore, according to GPOPAI (2008), the total invested by universities and public financial agencies (such as the São Paulo Research Foundation) through scholarships and publication grants is R\$78,410 over three years per master's thesis per student and R\$155,344 over three years per doctoral thesis per student. By comparing these values with what is invested by publishers of books derived from theses, the GPOPAI (2008) study concluded that 17.9 per cent of the total cost of a book based on a master's thesis comes from private investment, while 82.1 per cent comes from public investment. For doctoral theses, 9.9 per cent is from private sources, while the remaining 90.1 per cent comes from public investment.
- University presses also play an important role, and the estimated average value of public support (through either direct or indirect means) was 66 per cent of the total cost of the university press.⁸¹

At the school level, through the Ministry of Education, the Brazilian federal government operates three programmes geared toward K-12 textbooks: the PNLD (National Textbook Programme), which meets the demands of students registered in elementary education; the PNLEM (National Textbook Programme for Secondary Education), which meets the needs of secondary school students; and the PNLA (National Textbook Programme for Youth and Adult Literacy), which meets the needs of youths and adults who have already finished the regular school phases, but wish to continue their education to receive formal diplomas.

The textbooks for courses in a given school year are distributed free of charge to all students registered in elementary school, high school or the Brazil Literacy Programme. For those states that opted for decentralisation, such as São Paulo, the National Fund for Education Development (FNDE) transfers financial resources for the acquisition and distribution of textbooks, and the Secretary of

⁸¹ Rossini, C. (in press). From Apples to Legislation: OER Policy in Brazil. In Open Educational Resources (OER) and Change in Education: Reflections from Practice. Commonwealth of Learning: Vancouver

Education of that state has total autonomy with regard to the choice of titles. All of the resources used for the textbook programmes are financed by the general budget of the federal government, obtained through a tax called “salary-education”. In 2008, the total gross amount collected was R\$8,863,800,740 (Rossini, 2010a). The relevance of this data is to call attention to the amount of investment that moves from the government directly to the hands of private publishers through a long and complex process that has not changed in years.

Taking account of the expenses of procuring all-rights-reserved textbooks and thus attempting to move this system towards the use of OER, policy-building and advocacy has been needed at federal, state and local levels. There are currently four main policy efforts underway in Brazil. These efforts have demanded significant work behind the scenes to get policy makers to ‘buy in’ to the idea of OER and understand the role of the government in setting such policies. The work involved presentations and meetings to convey and discuss the main results of the research conducted by IDEC and GPOPAI in order to explain the economics of textbook and educational resource publishing, and how and when the government pays for educational resources.⁸² Given the numbers presented above, it seems likely that significant economic gains can be achieved from applying open licences to the textbook market in that country, particularly given the significant economies of scale. A parallel textbook model analysis completed in South Africa illustrates this potential quite clearly.

2.3.2 Educational textbooks in South African secondary education⁸³

As has been indicated, the high cost of textbooks is also being questioned in South Africa. The cost of materials acquisition in this context has also increased as a consequence of developments in pedagogical approaches, instructional design improvements, and the introduction of outcomes-based learning. This is because many modern printed materials typically tend to be workbooks, rather than traditional textbooks. This means that, once a single student has used the book, it cannot be used by other learners. If one examines traditional government models of Learning and Teaching Support Materials (LTSMs) acquisition in large-scale education systems such as the schooling system, it is clear that these models are not as economically efficient as they could be. The following scenarios, based on the South African context, compares the traditional acquisition model with an alternate model based on adopting an OER model which places intellectual property of materials paid for by public funds under an open licence:

Traditional Models of Textbook Acquisition

If a government education department in South Africa wishes to procure copies of Life Sciences textbooks for Grade 10 learners, the traditional approach is to rely on publishers to produce these textbooks and then attempt to sell these to the Department of Education. This model has certain advantages:

- It creates choices;
- It leaves the development of LTSMs in the hands of private companies, thus allowing competition to improve the product; and
- It prevents governments from having to make its own preliminary investments in developing LTSMs.

A brief review of this model, however, reveals several conceptual flaws worth interrogating. Let’s assume that the Department wishes to procure 50,000 copies of these textbooks (colour textbooks of approximately 300 pages each), at an average price of R60 (South African Rands) each. The cost of procuring these materials will be R3 million. Further, let’s assume that a requirement of the tender is

⁸² Rossini, C. (in press). From Apples to Legislation: OER Policy in Brazil. In Open Educational Resources (OER) and Change in Education: Reflections from Practice. Commonwealth of Learning: Vancouver

⁸³ Prices in this scenario are taken from 2006.

these materials have been produced to meet the specific requirements of a National School Curriculum and that the Department has been presented 10 competing products from which to select. If the average total cost of development of each textbook was R500,000, then this means the initial venture capital investment was R5 million. Looked at in isolation, this may seem to confirm an argument in favour of such a model.

However, if we are to assume that all of the publishers making these textbooks available are commercially viable organizations (that is, their venture capital investments ultimately yield profits of significant enough value to justify the initial investment), then it stands to reason that those publishers which have not been successful in selling enough copies of a single book must have an alternative strategy for recovering their initial investments on this book and then turning a profit. The reality is that this model of competition spreads the venture capital cost of textbook development across multiple products, in the expectation that several books will not sell well enough to recover their venture capital cost. So, publishers logically expect several of their products not to sell, and thus – if unsuccessful in one subject – hope to be successful in other subjects and/or grades.

This is one of the key reasons why such textbooks remain so expensive, even though advances in printing have reduced the (profitable) printing and distribution to a school of a print run of 50,000 books to, say, around R18 – R20 (a conservative estimate). The balance of the money spent goes to cover the overall venture capital cost of development of the publisher's entire textbook product base, after which it is recovered as profit. This has at least five key implications:

- 1) Systemically, it loads the cost of textbook acquisition with a series of failed venture capital investments;
- 2) It discourages publisher investment in niche courses and materials with limited distribution potential;
- 3) It discourages on-going revision, updating, and improvement of materials over academic years, as it makes business sense to sell the same textbook in as many years as possible before revising;
- 4) It tends to discourage collaboration amongst the best materials developers in producing materials, as each is competing for a fixed market; and
- 5) It means that, despite large investments by government, the education system is structurally incapable of building a public domain intellectual property base, off which new knowledge can be constructed.

An Alternative Scenario

An alternative approach to this strategy would be simply to shift the point of competition, so that – rather than encouraging publishers to compete at the point of sale of completed products – this competition occurs at two separate stages:

- At the point of development of the materials; and
- At the point of printing and distribution.

In this scenario, the same government department could deploy its R3 million investment for a set of 50,000 books very differently. It could set aside, say, R2 million for development of the materials and R1 million for printing and distribution (at an average cost of R20 per book). The investment in development of the textbook is four times higher than in the traditional scenario, thus allowing sufficient budget to buy out the copyright of the produced materials and to ensure a collaborative, team approach to materials development (demonstrated in many environments to lead to better quality learning materials, all other factors being equal).

This model has several benefits:

- 1) It leaves LTSM development and printing in the private sector, thus retaining the benefits of competition.
- 2) It allows companies to specialize in only one of the two functions if desired, thus opening the way to greater participation in the process by more organizations that might not have the inclination to want to compete in both areas.
- 3) It gives the tendering agency (the government department) the capability to require tenderers to cooperate during the development phase where it is perceived that such collaboration might lead to better materials.
- 4) It leaves intellectual property in the hands of Government. If this is deployed sensibly, say through release under an Attribution-Share Alike Creative Commons licence, it creates a globally accessible pool of Open Educational Resources on which other materials developers can build for future development processes.
- 5) If managed wisely, it can lead to choice over time (through selective investments in multiple versions of textbooks).

Table 7 Traditional Textbook Acquisition Scenario

	Initial Investment	Content Development Investment	Printing and Distribution Investment	Content Adaptation/Versioning Investment	Total Cost	Budget Balance (For Further Investment)	Cumulative Budget Balance (For Investment in other LTSMs)
Year 1	R3,000,000.00	R0	R3,000,000.00	R0	R3,000,000.00	R0	R0
Year 2	R3,180,000.00	R0	R3,180,000.00	R0	R3,180,000.00	R0	R0
Year 3	R3,370,800.00	R0	R3,370,800.00	R0	R3,370,800.00	R0	R0
Year 4	R3,573,048.00	R0	R3,573,048.00	R0	R3,573,048.00	R0	R0
Year 5	R3,787,430.88	R0	R3,787,430.88	R0	R3,787,430.88	R0	R0

Table 8 Alternative Textbook Acquisition Scenario

NOTE: This scenario assumes that, in year one, it is necessary to procure books according to the traditional model in order to facilitate the transfer from one approach to another.

	Initial Investment	Content Development Investment	Printing and Distribution Investment	Content Adaptation/Versioning Investment	Total Cost	Budget Balance (For Further Investment)	Cumulative Budget Balance (For Investment in other LTSMs)
Year 1	R3,000,000.00	R2,000,000.00	R3,000,000.00	R0	R5,000,000.00	R-2,000,000.00	R-2,000,000.00
Year 2	R3,180,000.00	R0	R1,060,000.00	R106,000.00	R1,166,000.00	R2,014,000.00	R14,000.00
Year 3	R3,370,800.00	R0	R1,123,600.00	R112,360.00	R1,235,960.00	R2,134,840.00	R2,148,840.00
Year 4	R3,573,048.00	R0	R1,191,016.00	R119,101.60	R1,301,117.60	R2,262,930.40	R4,411,770.40
Year 5	R3,787,430.88	R0	R1,262,476.96	R126,247.70	R1,388,724.66	R2,398,706.22	R6,810,476.62

This kind of economic logic has underpinned a recent initiative by the South African Department of Basic Education (DBE) to begin distribution of textbooks produced as OER. The DBE has:

printed open-licensed science and maths textbooks for every grade 10 learner in the country, and will follow up with grades 11 and 12 soon...when offered a good, open-licensed textbook written by volunteers and developed by Siyavula (a Shuttleworth Foundation project), the DBE decided that printing and distributing these to schools countrywide could be a key part of improving science and maths education in South Africa.⁸⁴

As the author of this report goes on to note:

A precedent has been set: the DBE printing open-licensed materials from a non-traditional publisher on a massive scale. Today, the right team of pros can produce open-licensed textbooks in months and pitch them to the DBE. Tomorrow, these might be ebooks or software on tablet computers. Their development might not be funded by a social-impact foundation, but a corporate sponsor. They could be produced as part of broader business models that involve teachers, learners, schools, device makers, distributors or printers. And the teams that produce them could do so under far better circumstances than the badly paid, debilitating, high-pressure environment that schoolbook production teams have become used to, often to their personal detriment.⁸⁵

2.3.3 Other emerging trends in open textbooks

As textbook costs rises, there is also a simultaneous move toward digital textbooks due to the increasing availability of ICT. The rise in sales of e-books in general is regarded as providing an indication of the growing opportunity for electronic textbooks.⁸⁶ This potential, combined with the potential of OER is regarded as an option to address the rising costs of textbooks. This has seen several organizations making electronic textbooks available for free. For instance Rice University's Connexions offers some free electronic textbooks. Furthermore, higher education textbook publishers like Textbook Media and Flat World Knowledge (FWK) use the 'freemium' pricing strategy, in which some goods are given away for free, while premium services are available for a price. Textbook Media offers free (advertisement supported) online textbooks and also offers print and electronic paid versions of the textbook that are not supported by advertisements. FWK also makes free online textbooks available and is trying to build a sustainable business based on open textbooks. The basic approach of FWK is similar to the traditional publishing process up to the point of publication. The model begins with recognized authors who have established reputations writing textbooks and receiving editorial and design support from FWK. Supplemental materials (such as digital flash cards, study guides, PowerPoint presentations, teacher materials) are also created. Once the book and materials are complete, the book is published online for free public access under a Creative Commons BY-NC-SA license. Alternate formats of the book (such as printed and audio versions) and supplemental materials are then made available for purchase. Notably FWK makes their books available for customization and remixing; and FWK offers audio versions as well as study aids.⁸⁷ FWK is thus able publish OER textbooks that students can use for free online or purchase in print for less than \$40 (compared to a typical \$175 textbook).⁸⁸

⁸⁴ <http://arthurattwell.com/2012/01/05/a-sea-change-in-south-african-schoolbook-publishing/>

⁸⁵ <http://arthurattwell.com/2012/01/05/a-sea-change-in-south-african-schoolbook-publishing/>

⁸⁶ Hilton, J.L., and Wiley, D.A. (2010) A sustainable future for open textbooks? The Flat World Knowledge story. *First Monday*, Vol 15, No.8

⁸⁷ Hilton, J.L., and Wiley, D.A. (2010) A sustainable future for open textbooks? The Flat World Knowledge story. *First Monday*, Vol 15, No.8

⁸⁸ Wiley, D., Green, C., and Soares, L. (2012). Dramatically Bringing Down the Cost of Education with OER - How Open Education Resources Unlock the Door to Free Learning. Educause

There have been several other approaches to reduce the costs of textbooks. In Florida in the US, the Open Access Textbooks Grant Project is aiming to create a model for open textbook implementation (<http://www.openaccesstextbooks.org/>). The focus is on creating a sustainable model for Florida and other states to discover, produce, and disseminate open textbooks. The project builds on efforts in Florida and across the U.S. to create a sustainable open textbook model and a collaborative community to further implementation of open textbooks.⁸⁹ ‘Concepts in Calculus’ textbooks are being developed by the faculty in the University of Florida Math Department. By providing access to just one text thus far (Concepts in Calculus I), Florida has helped 2,400 students over two semesters save up to \$516,000 - at a single institution.⁹⁰

Another notable initiative demonstrating the tremendous potential to reduce the cost of textbooks is that of the Washington State Board of Community and Technical Colleges launch of the Open Course Library. This is a collection of high-quality, low-cost educational materials for the state's 81 highest enrolled college courses. The project is funded in part by the Washington State government as an investment in reducing the cost of textbooks for the state's college students. The first 42 courses were released in October 2011, and the remaining 39 are slated for development in 2012 and release in 2013. The materials will be distributed digitally and can be used in place of traditional, more expensive textbooks. Some courses include commercially-published materials, but the total cost cannot exceed \$30 per student per term. Materials created through the programme are released under a Creative Commons Attribution license. Courses are designed and peer reviewed by faculty members of the Washington community and technical college system. The authors were compensated through grants, and were selected through a competitive process. All authors agreed to adopt the materials they produce, and, while use is optional, many faculty and departments have already moved to adopt them.⁹¹

The Student Public Interest Research Groups conducted an informal study to evaluate the Open Course Library's impact on textbook costs. Based on a survey of 22 of the 42 faculty who designed the courses, it is believed that these faculty and their departments alone will save students \$1.26 million by using these materials in place of traditional textbooks during the 2011-2012 school year. This alone is greater than the \$1.18 million cost of producing the courses. For students, the materials cost 90% less on average than the traditional materials previously used by faculty. Each term, this translates to \$102 in savings per student, and \$5,499 per course of students. Once the full 81 courses are released, the overall savings could climb to \$41.6 million annually if adopted for all 410,000 annual enrollments at Washington's community and technical colleges. The savings are likely to be even greater, since the materials are freely available for use at any college in the country. While 100% adoption is unlikely, usage at other colleges and universities across Washington and the country is likely to produce even greater savings. The results of this study show that the Open Course Library will not only save students millions on textbooks, but is also a good investment, generating a considerable return on the state's investment. Even in the unlikely case that the faculty who created the courses is the only ones who use them, the programme will essentially pay for itself in textbook savings within the first year, but it is likely that the savings will be far greater.⁹²

There is already evidence that the impact of these courses is more widespread. For example, the Saylor Foundation, a non-profit dedicated to free education plans to create professionally edited, modular versions of the courses. Project Kaleidoscope also intends to adapt the materials to suit

⁸⁹ Open Access Textbooks. The Promise of Open Access Textbooks - A Model for Success. Retrieved from <http://www.openaccesstextbooks.org/projectInfo.html>

⁹⁰ Donaldson, R.L. (2011) Response to discussion list on ‘Estimated cost savings when using OERs’. Fri Jul 29, 2011

⁹¹ Allen, N. (2011). Affordable Textbooks for Washington's Students: A Cost Analysis of the Open Course Library. Retrieved from <http://www.studentpirgs.org/textbooks/documents/affordabletextbooks-for-wa-students.pdf>.

⁹² Allen, N. (2011). Affordable Textbooks for Washington's Students: A Cost Analysis of the Open Course Library. Retrieved from <http://www.studentpirgs.org/textbooks/documents/affordabletextbooks-for-wa-students.pdf>.

California's community college students. Furthermore, the department of education in São Paulo Brazil plans to translate the material into Portuguese. While this analysis is based on a very small sample size that is not necessarily representative of the larger faculty population, the findings do at least make a convincing case of the programme's cost-saving potential.⁹³

2.4 Open Access Publishing

Another discernible area where there are debates on the economics of OER is in the field of open access publishing. The Wellcome Trust, in an examination of scientific publication, argues that savings of up to 30 percent could be achieved through open access publishing.⁹⁴ Harvard University has encouraged its faculty members to make their research freely available through open access journals and to resign from paid publications. This is in response to rising subscription costs by academic journal publishers which costs the university's library approximately R3.5m a year.⁹⁵ It is believed that their decision to take on the publishers may prompt other universities to follow suit.

In the United Kingdom (UK) Houghton and Oppenheim (2010) considered the costs and potential benefits of alternative models for scientific and scholarly publishing and whether there are new opportunities and new models for scholarly publishing that might better serve researchers and more effectively communicate and disseminate research findings. The paper summarized the findings of a study undertaken for the Joint Information Systems Committee (JISC) in the UK.⁹⁶ They considered three scholarly publishing models: the subscription publishing model, in which the publisher charges a fee for a subscription to a journal or the purchase of a book; the open access publishing model, in which access to the journal or book is free of charge with publication costs being paid by the author or the author's institution or funding body; and the open access self-archiving model (Green OA), under which the author deposits a manuscript in a freely accessible online repository. They acknowledge that the last is not in itself a formal publishing model, but they seek to turn it into a formal model by either running self-archiving in parallel with subscription publishing, or overlaying on it some form of post-archiving peer review, quality control and branding.⁹⁷

The authors estimated that open access publishing for journal articles using the 'author pays' model might bring system savings of around £500 million per annum nationally in the UK in a worldwide open access system (at 2007 prices and levels of publishing activity), of which around £430 million would accrue in higher education. Open access self-archiving without subscription cancellations (Green OA) might save around £108 million per annum nationally in a worldwide Green OA system, of which around £75 million would accrue in higher education. The open access self-archiving with overlay services model explored is necessarily speculative, but would be likely to produce similar savings to open access publishing using the 'author-pays' model. They do acknowledge that in reality there are variations and hybrids (e.g. delayed open access, and open choice/author choice) and the models co-exist in various mixes in different fields of research.⁹⁸

⁹³ Allen, N. (2011). Affordable Textbooks for Washington's Students: A Cost Analysis of the Open Course Library. Retrieved from <http://www.studentpirgs.org/textbooks/documents/affordabletextbooks-for-wa-students.pdf>.

⁹⁴ Downes, S. (2007). Models for Sustainable Open Educational Resources. *Interdisciplinary Journal of Knowledge and Learning Objects*, Vol 3. Retrieved from <http://ijko.org/Volume3/JKOv3p029-044Downes.pdf>

⁹⁵ Sample, I. (2012). Harvard University says it can't afford journal publishers' prices. *The Guardian*, Tuesday 24 April 2012. Retrieved from <http://www.guardian.co.uk/science/2012/apr/24/harvard-university-journal-publishers-prices>

⁹⁶ Houghton, J.W., and Oppenheim, C. (2010). The economic implications of alternative publishing models, *Prometheus*, Vol 28(1); 41-54

⁹⁷ Hall, S. (2010). A commentary on 'The e The economic implications of alternative publishing models, *Prometheus*, 28(1); 73-84

⁹⁸ Houghton, J.W., and Oppenheim, C. (2010). The economic implications of alternative publishing models, *Prometheus*, 28(1); 41-54

It concludes that different publishing models can make a material difference to the costs faced and benefits realized from research communication, and it seems likely that more open access to findings from publicly funded research would have substantial net benefits. They also note that while open access publishing models relate to research publications alone, enhanced access and reduced permissions barriers could be important in all of these (arguably, with the exception of the third).⁹⁹

The paper is regarded as a major contribution in considering the case for open access and for open institutional repositories as a standard resource in publicly-funded universities.¹⁰⁰ However, it also drew much debate with criticism leveled around the methodology employed, that certain costs have not been taken into account in the model and that some of the figures are incorrect.¹⁰¹ Among the criticisms noted is that it is difficult to compare the models as the subscription model is mature and costs can be known, whilst the open access model is immature and not yet proven to work in any sustainable or scalable way. Other criticisms is that the research is outdated, there has been no engagement with the subscription publishing industry during development of the report, and that it is not feasible to ask publishing industry to provide figures as these are commercially sensitive in a highly competitive industry, selective use of data with a bias towards open access.¹⁰²

Another criticism is that this will not make substantial difference to UK scholars, as they have immediate access to the vast majority of the scientific articles that they need for their research.¹⁰³ However, there are substantial benefits for scholars from the developing world, particularly in the context of limited resources. Furthermore, Hall (2010) argues that even if the differential had been zero, there are still benefits to open access, particularly if the research is publicly funded.

*A true comparison between the system of open access publishing and repositories and the for-profit, subscription model of publishing would require that the investment in public funding was either factored out, or corrected by means of a return on the investment through profits from sales. This would require that subscription publishing was at least £5 billion cheaper than open access across the UK's scholarly output system as a whole.*¹⁰⁴

Regardless, the debate has opened up options to new ways of locating public investment.

2.5 OER and accreditation

An additional economic trend in OER worth noting pertains to efforts to shift the pricing of accreditation models using OER, effectively by making course materials available for free and then charging only for assessment and accreditation when students have worked through those materials. Various models of this kind are now being piloted by universities. Possibly, the most ambitious of these is the OER University (OERu).¹⁰⁵ The plan is to draw together existing free online learning materials from around the world and develop new OER to create whole degree programmes that can be studied via the internet for free.

⁹⁹ Houghton, J.W., and Oppenheim, C. (2010). The economic implications of alternative publishing models, *Prometheus*, Vol 28(1); 41-54

¹⁰⁰ Hall, M. (2010). Minerva's Owl. A response to John Houghton and Charles Oppenheim's 'The economic implications of alternative publishing models, *Prometheus*, Vol 28(1); 61-71

¹⁰¹ Houghton, J.W., and Oppenheim, C. (2010). The economic implications of alternative publishing models, *Prometheus*, Vol 28(1); 41-54

¹⁰² Hall, S. (2010). A commentary on 'The economic implications of alternative publishing models, *Prometheus*, 28(1); 73-84

¹⁰³ Hall, S. (2010). A commentary on 'The economic implications of alternative publishing models, *Prometheus*, 28(1); 73-84

¹⁰⁴ Hall, M. (2010). Minerva's Owl. A response to John Houghton and Charles Oppenheim's 'The economic implications of alternative publishing models, *Prometheus*, Vol 28(1); 61-71

¹⁰⁵ Attwood, R. (2011). 'OER University to cut cost of degree'. Times Higher Education. Retrieved from <http://www.timeshighereducation.co.uk/story.asp?storycode=415127>

The OERu aims to provide free learning to all students worldwide using OER learning materials with pathways to gain credible qualifications from recognized education institutions. It is rooted in the community service and outreach mission to develop a parallel learning universe to augment and add value to traditional delivery systems in post-secondary education. Through the community service mission of participating institutions the project plans to open pathways for OER learners to earn formal academic credit and pay reduced fees for assessment and credit.¹⁰⁶

Thus, the project will focus on how to offer students using OER the opportunity to earn academic credit and have their work assessed at a significantly reduced cost. It is hoped that these degrees could cost up to 90 per cent less than a traditional qualification gained through on-campus study. It is believed that this initiative would widen access to higher education in the developing world as well as helping students in the developed world faced with rising tuition fees. Universities would work together to develop learning materials under open content licences. The universities will use existing materials, as well as producing new OER themselves to fill the gaps and create coherent courses. It is estimated that an OER university degree could be '10-15 percent' of the cost of a traditional degree. The system could run alongside traditional modes of delivery.¹⁰⁷

This move towards such a collaborative approach spanning several institutions is inspiring, although it will require research and monitoring in order to determine if it fulfils its economic potential.

¹⁰⁶ Wikieducator. OER University. Retrieved from http://wikieducator.org/OER_university/Home

¹⁰⁷ Attwood, R. (2011). 'OER University to cut cost of degree'. Times Higher Education. Retrieved from <http://www.timeshighereducation.co.uk/story.asp?storycode=415127>

3 Conclusion

Good education cannot be created or sustained without spending properly on it, regardless of which methodologies or technologies are used. Investing in education can only ever be meaningfully justified in terms of the long-term social and economic benefits that it will bring societies, not in terms of how those investments will help to enrol more students at progressively declining unit costs. The OER movement considers these long term benefits in its arguments on the cost effectiveness of OER, particularly in the context of global challenges of increased student enrolments and higher costs in education. However, there is limited concrete corroborating evidence to support this assertion.

Although data available is limited, this paper has found that there are at least three areas in which emerging data demonstrates actual economic gains to be had from harnessing OER. These are:

- 1) Harnessing OER in the creation of new, contextually relevant courses. The case study from Guyana demonstrates powerfully, if only anecdotally, the significant cost reductions that this approach can yield.
- 2) Applying open licences in the textbook market. The economics of the textbook market, especially in places where economies of scale are readily applied, indicate clearly that significant efficiency gains can be attained by shifting to open licences. This is accompanied by clear evidence from around the world that governments are increasingly understanding this potential and starting to shift decisively towards such models.
- 3) Releasing research under open licences. Although not OER per se, research is a critical resource requirement for effective education, particularly at the higher education level. Although there is still some debate about the merits of open access approaches, data is emerging that demonstrates the economic value to be gained from supporting open access models.
- 4) Harnessing OER to create alternative accreditation pricing models. This work is still in its infancy, and thus there is no concrete data to demonstrate actual economic gains, but it will be interesting to monitor progress in this area over the next few years.

Encouragingly, there is a drive within the OER movement towards making a case for public funding of OER. Brazil provides a good example of efforts to mobilise government support with concrete figures as to the rising of textbooks. However, simultaneously it is important to provide actual costs of moving to an open model to illustrate its potential for sustainability. This is also particularly important as many are trying to develop sustainable OER models independent of donor funding.

Whilst this paper has provided an overview of the economic benefits of OER, it is clear that there remains a need for further research to explore the economic gains to be achieved from harnessing OER, as well as analysing any unintended consequences that this might generate. With this in mind, it is recommended that future research focus on the following:

- Conducting an analysis of indirect income revenue generated through OER activities, particularly in instances where universities with OCW have begun to collect this information. It will also be particularly important to track the progress made by the OER University.
- Future research on OER should include a focus on actual costs of creating OER to build a rich data bank of resources to help government and institutions make informed cost benefit analysis of adopting an OER model. Focus should be placed on creating content from scratch as well as actual costs of adapting/converting content to OER.
- Conduct a longitudinal analysis of organisations that have adopted OER Business Models to determine their sustainability over the long term.
- Encourage new OER ‘projects’ to include a financial assessment element to address the cost efficiency of the model. These results should be made publicly available to help make decisions around adopting OER.

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