Challenges facing eTextbook provision to South African schools

Nomusa Dlodlo
CSIR – Meraka Institute
Box 395, Pretoria, 0001, South Africa
ndlodlo@csir.co.za
(+27) 0128413190

Thato Foko
CSIR – Meraka Institute
Box 395, Pretoria, 0001, South Africa
tfoko@csir.co.za
(+27) 0128414596

ABSTRACT

One of the mandates of the Department of Basic Education (DBE) in South Africa is to distribute textbooks to both urban and remote rural schools. The challenge that the DBE faces in this regard is that the distribution machinery has not been that efficient, resulting in some schools opening without the necessary textbooks. Distribution problems to schools has also meant that some schools are using outdated books, especially now that the new CAPS curriculum has recently been introduced. This article reports on the alternative to paper book provision in South African schools, in the form of provision of eBooks to schools. This means making available digital books that can be downloaded to the various schools to avert problems associated with distribution delays and to ensure that books that are aligned to the current curriculum are available at any point in time.

Although eBooks in general have many advantages, South Africa cannot subscribe a uniform solution to all schools. It is the current information and telecommunications technology (ICT) infrastructure and financing of such a project that determines the mode of eBook provision at the end of the day. Not overlooking the fact that there is a serious digital divide in South Africa, which pits the well-endowed urban schools against the poor-resourced deep rural schools, a number of recommendations on how eBooks can be made available to schools are outlined in this research. The proprietary eBooks and eBook readers as provided by the established international companies are very expensive for the South African environment, and this would result in uneven access to such resources. Therefore South Africa has to come up with its own low-cost appropriate technologies to enable eBook provision to the schools. The option is to take advantage of the current ICT infrastructure that has been rolled out by the government in the form of projects such as computers for schools. The problem is that this sort of infrastructure hasn't been rolled out to all schools yet, with the deep rural schools unlikely to have any such computer networks. Where there are, these school networks can be configured for eTextbook accessibility via desktop computers, laptops, tablets and Smartphones for those that cannot afford the expensive eBook readers. Mobile access is approaching 100% in South Africa, although there is no guarantee that the phones that are in the hands of the majority of the people support internet access and multimedia services. The DBE should set up its eTextbook store which comprises content by local publishers, is customised to the local environment, has the appropriate digital rights management (DRM) in place and can be easily accessed by these schools.

Author Keywords
eBooks, eTextbooks, education, ICT, eBook readers

INTRODUCTION

Against considerable data demonstrating that education and literacy are key drivers of economic growth and that there is correlation between low literacy and high poverty levels in the developing world (2005 World Bank Development Indicators database) and that access to books can boost reading ability, South Africa's Department of Basic Education (DBE) is looking at the prospect of introducing eBooks to boost reading. eBook refers to electronic files of words and images that are of book length, formatted for display on one or more devices known as eBook readers and sold or distributed as stand-alone products. eBook readers are defined as the devices used to read eBooks. These could be handheld or not, dedicated or not. The software that enables the display of eBooks on PCs or other devices would be referred to as eBook reader software, even though some software companies such as Microsoft refer to their applications as readers (NetRead, 2000). eBooks can also be defined as a text in digital form, a book converted into digital form, digital reading material, a book in computer file format, an electronic file of words and images to be displayed on computer over a network, or viewed on a desktop/notebook/dedicated portable device, or read on all types of computers, or formatted for display on eBook readers (Jenkins, 2008). There is a growing range of eBook readers, that is, devices created specifically for storing and reading eBooks, each of them exploring one aspect of the paper book , that is, portability.

In the process of boosting reading though, we must not overlook the fact that South Africa has two extremes- the well-ICT-endowed urban areas and the deep rural areas which have no ICT infrastructure at all. What then would be the best approach to provision of eBooks to all South African schools? This research is structured to introduce case studies of

eBook provision in a number of countries including South Africa and draws lessons from their experiences. It looks at the current South African environment and recommends a South African solution to eTextbook provision.

LESSONS LEARNT FROM ETEXTBOOK INITIATIVES IN OTHER COUNTRIES

The following are examples drawn from some eTextbook initiatives in Ghana and the USA

WorldReader is an initiative that brings eBooks to people in developing countries. Ghana is one such recipient. Between 2010 and 2011 WorldReader conducted a pilot study whose purpose was to bring eReader technology to gauge how well students cope with it and use it to study. The pilot project was called Impact on Reading of eReaders (iREAD) (iRead, 2010) and it provided Kindles and eBooks to students in 9 different cities. Local content was created by digital conversion of 82 Ghananian books. The learners learnt to use the eReader very fast. They ran into problems like accidentally deleting books, or being distracted by non-reading functions such as music. The following lessons were concluded from the pilot:

- ❖ Out-of-classroom reading is critical to the success of learners.
- ❖ Children were allowed to take eReaders home. As a result of the devices breaking too often, protective cases had to be provided. Lights were also provided for reading at night
- ❖ It is necessary to transition from a single user eReader model to a library model. This model would significantly reduce the numbers of eReaders required at any school
- ❖ WorldReader negotiated the rights with Amazon to use the books across hundreds of eReaders since Amazon systems impose a maximum of 6 Kindles sharing the same book simultaneously.
- ❖ Each eBook ranges from a few hundred kilobytes to several megabytes depending on the length, number. of pictures, etc. When multiplied by the large number of eReaders accessing at the same time, this represents an enormous amount of data. Simultaneous access becomes difficult due to bandwidth constraints.
- ❖ Building an entire ecosystem around eReaders where consumers can buy eBooks using credit from scratch cards, similar to prepaid mobile phone, was devised.

California's Free Digital Textbook initiative (California Learning Resource Network, 2012), uses free digital textbooks in various subjects for use by the state's public schools and teachers sharing their online and self-created materials. The books are openly licenced under a Creative Commons (CC) licence. The initiative focuses on open educational resources (OER) movement. The licence gives the educators the power to remix, share and distribute materials as needed to be timely and maximally relevant to the curriculum. The lessons drawn from this initiative are as follows:

- ❖ The flexibility afforded by a CC licence allows for material to be adapted quickly. Many topics in the science and technology domain are changing so quickly that education can no longer afford to wait for proprietary material to go through their lengthy cycles of publication
- ❖ Most teachers do not have the access, training and support necessary to confidently participate in the OER movement
- ❖ The traditional textbook pricing model is not really scalable, especially not so for money-strapped schools. So it makes sense to use free alternatives instead.

CourseSmart is an online 'retail source" operated by six of the leading textbook publishers in America (CourseSmart, 2012). It includes eTextbooks from Pearson, John Wiley and Sons, Cengage Learning, McGraw Hill Education, Bedford Freeman and Worth Publishing Group and Jones and Bartlett Publishers. They offer eTextbooks at half the price of the hard copy. CourseSmart Affiliates who place a link on their website to the company receive 5% of net sales on all purchases by students directed to CourseSmart from their site. The books can be downloaded to the student's computer or accessed online from any computer. Students can highlight and type notes on electronic copies of the book as well as copy small sections or print 10 pages at a time. The digital copy uses .pdf as the source format. The following lessons were concluded:

- ❖ The availability of titles is increased by bringing together a number of textbook providers.
- ❖ The fact that the .pdf format was used ensured compatibility and a single standard in the textbook format from the library
- ❖ Instead of proprietary eBook readers, the student's computer is the reader.

Apple has launched an eTextbook application in New York City. The application works through iBook so that students will be able to access their textbooks as they do currently when reading other books on their iPads. This allows publishers and educators to produce digital textbooks from which students can learn interactively, making their learning more engaging and exciting. The following lesson can be drawn:

- ❖ The fact that the iPad eReader was used limited access only to the iBook store, which in turn limits the variety of titles.

SOUTH AFRICAN ETEXTBOOK INITIATIVES

The Siyavula initiative (Siyavula, 2012) project allows pupils from Grade 10 to 12 to download Maths and Science textbooks free and provides videos and presentations that they can source via the internet or on cell phones. The textbooks are written by volunteers and are provided free of charge to schools. It costs the government only R40 to print and distribute one of these textbooks, whereas previously the Department of Education had to pay R150 a book. Schools can download the books and print them at their cost. The content is licenced and used free of charge.

The books can be freely copied, printed and distributed as often. It can be downloaded onto mobile phone, iPad, PC, flash drive and can be burnt on CD, emailed around and uploaded to a website. The only restriction is to keep the book, its cover and short codes unchanged. All exercises inside the book link to a service where the learner can get more practice, see the full solutions, or test their skills development on mobile and PC. The eBooks are accessible on www.everythingscience.co.za and www.everythingmaths.co.za The lessons learnt so far are that:

- ❖ Locally-produced content is appropriate and low-cost
- ❖ This local content can be licenced on an open access licence to the benefit of local schools and can be freely copied, printed and distributed

The Yoza project is available on MXit in South Africa and Kenya (Yoza, 2012). Originally known as m4Lit (mobile phones for literacy), it explores the viability of using mobile phones to support reading and writing. It targets the youths with engaging stories that include stories from genres such as soccer issues and teen romance. The lesson learnt is that:

- ❖ South Africa can take advantage of cell phone technologies in the provision of eTextbooks

Kalahari.com is the first retailer embarking on introducing eContent widely to learners and university students (Kalahari.com, 2012). Partnering with the PETS Foundation (Programme for Educational Tablets in Schools), Kalahari.com is supporting a research project that introduces the most effective technology into the learning experience. This project explores educational, financial, technological and logistical viability of introducing tablets, digitized texts and related technologies into the South African schools over a period of 5 years from 2012-2016. 350 eReaders are being piloted at the Vulindlela Reading Club at the St. Louis primary School in Langa. The lesson that has been derived so far is that:

- ❖ The tablet for eTextbook delivery must be lightweight and durable enough to stand up to the treatment of young users.
- ❖ Using tablets instead of dedicated eReaders could be the appropriate solution

Van Schaik, a textbook supplier are adding eTextbook solutions to their offerings using Ingram's VitalSource online platform (Van Schaik, 2012). The Vital Source reseller solution provides Van Schaik with tools to sell and deliver eTextbooks to its widespread customer base without costly infrastructure investment. The VitalSource platform is a true online/offline e-book solution, with robust iOS and Android apps complementing Mac, Windows and browser-based access. The multiplicity of access options in crucial in emerging environments like South Africa. Students enjoy the benefit of the VitalSource platform including integrated download, online and mobile content options, advance searching and annotation, note-sharing and accessibility features. The lesson that can be drawn from this is:

- ❖ An offline/online solution to eTextbook provision can resolve the issue of access/no access to the internet

CHALLENGES TO ETEXTBOOK PROVISION IN SOUTH AFRICA

There are a number of challenges to eTextbook provision in South Africa. They are as follows:

Standardisation: There is no common eBook format. Proprietary formats are equipped with digital rights management (DRM). This technology controls access and is used to protect copyright material and limit usage of digital material and devices (Kumar, 2009).

Pricing: The cost of hosting eBook content, maintaining platform features and providing technical support increases the cost of eBooks. Pricing models are varied from publisher to publisher and vendor to vendor

eBook purchasing: eBook purchasing options vary and several factors must be considered before ordering. Will it be purchased as a subscription, one-time with perpetual access, or as a selection through patron-driven acquisitions. eBooks ordered as a subscription are purchased annually. If the subscription is cancelled, all access is lost. eBooks purchased with perpetual access are owned by the library similar to a printed book. The cost of the perpetual access eBook is usually higher than the subscription option and does not include any revisions or updates. Another option for purchase is patron-driven acquisition. In this model, the library has an agreement with the vendor, to load records for a collection of titles into their online public access catalogue. If a given title is accessed a certain number of times, as agreed in the contract, the library purchases the title. Many publishers such as Elsevier, Wiley and Springer require that every eBook

title purchased must be added to the university licence through an addendum and signed by both parties (Jackson, 2011). eBook purchase is not a simple purchase as in case of print books, but continues to send annual access fees

Availability of titles: The eBook market is characterised by proprietary ownership. eBooks can only be accessed using particular eReaders. The Barnes and Noble bookstore can only be accessed using the Nook, Amazon bookstore can be accessed using the Amazon Kindle, etc. If South Africa is thinking of purchasing from these established bookstores, does it mean that these bookstores stock textbooks that are specific to the South African curriculum? Traditionally, inventories of goods offered by any single vendor are limited. On the other hand, with paper books, books can be purchased from random vendors.

Energy supply: Energy is required to run an eBook. Unfortunately not all schools have access to a reliable energy supply, in particular those in deep rural areas.

Creating content: If a South African solution is required for content production, that will go round the proprietary nature of eBooks and eBook readers, local content producers will have to be trained. Currently there is a shortage of skills in that area. South African appetite and aptitude for eContent is growing. It should extend to the education sector to increase access to content, aid learning in the classroom and also reduce the cost of learning materials over time.

Infrastructure availability – broadband capacity: If it is just a case of provision of eBooks that are of a standard nature, connectivity is not an issue. Download can be via the internet for those schools that have access to the internet, and offline for those that do not have. Schools should already have their own computer networks, if the computerisation of schools is a successful project, that is. Currently, some schools do not have computers and licencing of software is beyond them.

Technical support and infrastructure: The challenge though is not only about the cost of deployment of infrastructure to support eBooks but also the cost of maintenance of the infrastructure. Schools do not have the required technical support personnel.

Security considerations: The schools have to ensure that their stock of eBook readers are kept intact. The problem is that these eBook readers are in the hands of young, immature children., and hence there is no guarantee that they will be secure. Even security of eBook readers which can be kept within the school premises, has to be ensured. Once any readers get the lost, then a vicious cycle of thefts will occur, and at the end of the day there will be problems of access to eBooks. Schools with such equipment would have to invest in expensive alarm systems and surveillance cameras. But such equipment is beyond the reach of most schools which are already underfunded. Leaving eBook readers in the hands of learners puts them at risk of being the targets of criminals, just as cell phone technologies have been.

Copyright issues: Authors and publishers are wary of digitising their works, as these are more likely to affect their profits when copyrights are violated. In storage, transmission and download pose security threats. How do we ensure that the eBook that is downloaded to a reader is only made available only to the person who is authorised to have it and cannot be copied. Currently regulation by publishers restricts the number of pages that can be downloaded via software search.

Access to eBook readers: Not everyone has access to this technology. There still exists a digital divide in South Africa. Therefore we cannot subscribe an umbrella decision on provision of eBooks to all schools.

Durability of eBooks: eBook readers easily break down and worse still being in the hands of young people. That would mean that the DBE has to have a constant supply of eBook readers, and most probably as frequently as paper costs. That would mean that the intention to cut down on book provision costs to schools would be comprised, through ensuring a constant supply of these books.

E-waste: Introduction of eBook readers will lead to an increase in potential sources of e-waste. E-waste is discarded electrical/electronic devices that pose a health risk to communities due to leaching of material such as heavy metals from landfills

Staff training: Staff are not properly trained to deal with and make use of new technologies that they are provided with; providing adequate equipment and keeping them running smoothly and up-to-date is difficult, in terms of finding the money to provide for them and also the expertise; ongoing funding is hard to maintain, with education departments usually not having enough money to pay staff, let alone fund computer equipment; and lastly integration of computers and related technology into the school curriculum. An educator is not necessarily trained in ICT., and education institutions are not offering that training. Therefore schools need to employ ICT professionals. Unfortunately ICT professionals expect market salaries which are well above educators'.

Digital Rights Management: DRM refers to a system used by publishers, copyright holders and individuals to limit the use of digital content and devices after sale to protect their copyright and prevent piracy. The eBooks cannot even be shared among devices in some cases. One owning different types of readers have to purchase the same book more than once. Passive DRM and eBook watermarking as an alternative to active DRM allows sharing but the content is protected from piracy because the content can be traced back to a source device. This limits the number of times a single book can be shared.

RECOMMENDADTIONS ON ENABLING ETEXTBOOK PROVISION

DBE eBook store: The DBE should come up with an eBooks store of recommended textbooks. It should be encouraged to give incentives to local authors and publishers to develop local content for these eBooks. The eBook store can play the role of a library. The only problem is that a library carries a whole range of books some of which are from external sources. In this case a single standard in textbook format to enable access by all is required. This would be formats that are not protected such as .pdf, .mobi, plain text, etc. The eBook store should allow content to be remixed, shared and distributed (Dlodlo, 2011).

Configure the school networks: The current school networks should be configured to enable download of eBooks from the DBE eTextbook bookstore. The store should allow simultaneous access and the availability of the required titles.

Networks of community-based eTextbook provision centres: To tackle exclusion, setting up a network of community based ICT centres and multiple eBook access points to complement any access would suffice. This would mean that those that would not have access to eTextbooks in their schools can take advantage of such. This can be through public access facilities such as Thusong centres, through public information terminals at post offices and libraries , internet cafes and kiosks.

Licencing issues on locally-developed content: To ensure that only authorised schools have access to the resources, each school should have an access licence. Just like in the California Free Digital Textbooks initiative, the OER movement should be encouraged, so that the skilled teachers can contribute content under an open access licence.

Hybrid system: Instead of total changeover from paper books to eBooks, a hybrid approach can be adopted. Schools that have the resources such as electricity and finances for technology purchase and skilled teachers can introduce eBooks. Any savings from the introduction of eBooks into such institution can then be ploughed into those schools that do not have the infrastructure. Currently a number of rural schools do not have even the buildings to learn in. Therefore the first step should be towards the provision of such, before the big leap into eTextbooks.

Format of eBook reader: In cases where finances area available the DBE should fund a cheap eBook reader that is rabid and supports a mechanism that allows only the authorised learner to use it. The DBE can design their own format of an eBook reader and put DRM on it that can only read the school books that learners have rights of access to. It won't be worth selling to anyone else, hence security and copyright is ensured. To pass a DRM is easy, hence biometric identification of the learner can be the next source of security of the content. Learners can also access formats that are not protected such as .mobi, .fb2, plain text and .pdf

Digital TV: Digital TV has the potential to reach 100% of the population although now it stands at 60%. The digital TV pushes content to the viewers. This material can be pushed to the memory of the decoder and then downloaded to the school servers.

Online/offline distribution: Once content of the eBook has been created, the master file of the eBook can be downloaded, either offline or online to the loading station of the school to upload to eReaders. The offline / online download will be determined by whether the school has internet access or not.

Replacement strategy: An eBook replacement and upgrading strategy has to be put in place to avoid the glitches in eBook provision.

Accelerate distribution of ICTs to underdeveloped regions: Without the necessary infrastructure, schools in less developed areas will continue to lag behind. Therefore the need to accelerate government programme for the installation of ICTs in schools.

Library reader model: It is important to transition from a single reader to library reader model, if the case is for the provision of books which are in short supply. This means that the funds towards infrastructure are reduced.

Drawing lessons: The initiative should draw lessons from current South African eBooks initiatives like Siyavula before any decisions on the way forward are made.

CONCLUSIONS

There are a number of challenges facing textbook provision to South African schools, including an inefficient textbook distribution network. This research looks at an alternative book supply option in the form of eTextbook provision. The challenge though would be that of inadequate ICT infrastructure that would hinder equal access by all. The paper looks at the challenges and makes recommendations on how this situation can be resolved. The research proposes that the DBE come up with its own eTextbook store that is based on an open-access licence. Learners can access this store through their school networks and on mobile technologies. Those without networks can access through public facilities such as libraries, Thusong centres and kiosks.

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