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A Proposed eBook Model for Engaging Peer-Interaction

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Abstract: *Modern teaching techniques require that students be engaged in class and in the subject content through peer interaction as a method of active learning. Increasingly, ICT tools are being used to implement active learning methods. Handheld devices such as ibook, ipad, tablets used as ebook reading devices have recently gained momentum as they provide reading access to academic subject content including eBooks for students studying business courses. Such devices use text, images, audio, video, animation and interactivity such as playing games and question/answer sessions. As the ebooks and animation games are generally downloaded to the handheld devices, the environment in the local device does not provide facilities whereby students can share ideas on the content, discuss and solve problems, i.e., engage themselves in the content through peer-interaction as a form of active learning. This article studies current ebook reading technologies and the role of stakeholders involved in preparing and delivering content to the users. Having looked at the total environment involved, the article proposes a theoretical model whereby the stakeholders involved can interact to bring the benefits of active learning to ebook preparation, production, hosting and use by teachers and students. In the proposed model the eBook author provides content and questions, the publisher publishes contents as html page content, the instructional designer designs the active learning interactivity, teachers can assign tasks to students to get involved by selecting relevant content for subject learning and students can engage by commenting on images and paragraphs, asking questions and sharing their problems and solutions with peers as needed for learning and filling in gaps in understanding.*

Keywords: *eBook stakeholders, engaging readers, peer-interaction, eBook production, designing eBook interactivity, academic eBooks, business courses*

Introduction

In recent years books in electronic format or ebooks available on the Internet and the number of hand-held devices on which such books are available has increased drastically as they provide reading access to academic subject content including eBooks for students studying business courses (Hanover Research, 2013).

So much so that, as reported by MacWilliam (2013) Princeton University, National Institute of Standards and Technology (NIST), Queensland University of Technology, UCLA and the Pew Research Centre all have recently documented evaluations of various ebook reading devices from a variety of angles. The studies involved university students and libraries, textbooks and fiction, as well as a comparison between different ebook readers, functionalities and interactivity built-in.

MacWilliam (2013) thoroughly reviewed each of these studies and the angles from which the evaluations were done. He points out that we are now in the Fourth Generation of

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eBook readers while giving a rundown of all four generations. The latest generation features multifunctional technology with embedded videos and audio as well as animation facilities and Internet connectivity. He points out,

> **"**Tablet computers, the fourth generation of ebook device, also offer a reading platform but are layered with other applications and do not offer a dedicated reading environment but a multimedia experience. Their advantage is that they offer multimedia content and platforms on which enhanced ebooks and ebook apps can be developed. It is because of these devices that the ebook is now much more than a digital version of its printed predecessor.**"** {p.3}

While tablet PCs are competing in technically advanced capabilities, *i.e.,* speed, memory space and apps, all these additional features represent a departure from the traditional paper-based book. MacWilliam (2013) concludes that "Enhanced ebooks and ebook apps have become the focus for many publishers today and offer a way to an enriched user experience that enhances the book with multimedia." In contrast, a comprehensive study done by Wilson (2001) more than 12 years ago insisted on enhancing the particular paper-based book experiences that readers traditionally enjoyed. Mac William (2013) therefore studied what he calls the "Emotional Factors" involved in reading. Such personal emotional factors, as also echoed by Roxburgh (2012), play a factor in the popularity of reading as an activity. To gain a personal understanding of the emotional factors of how young people relate to the written word and its corresponding multimedia a 25-year old was interviewed. This 25 year old had read all the Harry Potter books and watched all the corresponding movies. She had also read Lord of the Rings and watched the movie of it. She said,

> **"**The Harry Potter books were way better than the movies. The language in the books is so descriptive that it just allowed my imagination to soar – often with me in it. The (Harry Potter) movies on the other hand represented imagination of a very limited kind – maybe because of the producer or perhaps the movies were hurriedly made to cash in while the popularity was at its peak. In contrast, the movie *Lord of the Rings* was, I felt, better than the book. The book, in parts was difficult to understand – so the movie interpreted the book for me.**"**

So for this young person reading enjoyment is related to being able to engage her imagination and to reading comprehension. Much therefore depends on the author's or movie's ability to engage the imagination of the reader. The need for engagement is also necessary for learning in an academic environment as pointed out by previous studies (Richards, 2012). Richards (2012) points out the learning challenges for students using e-textbooks in a higher education setting and concludes that,

> **"**Active reading skills such as highlighting, bookmarking and annotating are important for comprehension, regardless of format. E-textbooks typically include these features, and while current college students may be digital natives, they still need guidance to use these learning tools effectively.**"** (Richards, 2012)

For e-textbooks guidance implies assignments and activities given by teachers in a higher education setting. Opportunities still exist to include the popular features of active learning that engage the student, *i.e.,* the students must have questions to delve on and they must read, write, discuss and be actively engaged in solving problems posed at the higher education level (Active Learning, Wikipedia)

The research question is therefore, *do ebooks currently allow facilities for active learning?*

Literature review:

Active learning should be involved in Ebooks for academic text. For this purpose two areas have been studied.

Academic Text:

Much of the efforts towards ebooks publishing are directed towards the enjoyment of fiction and literature reading. To find the needs of students studying academic texts, the E-reader pilot at Princeton University (2010) involved a number of batches of university students where they compared the electronic version books with similar paper-text in various aspects. In the face-to-face interviews, the students had something interesting to say. They wanted some features that facilitate learning, such as ability to highlight text and write notes against the highlighted or marked***** text. This pointed to something new – the need for the same features as that used by students to learn from hard copies. Such features are unnecessary for general fiction reading but essential for academic text where students not only need to comprehend text but they also need to apply their learning in various situations. To do so, sometimes they need to be able to quickly refer back to the highlighted text or to the notes they have made. The authoring tools now available therefore not only allow the addition of interactive multimedia content, they also have features for highlighting and *note taking* as shown in Figure 1.

Figure 1. Interactive features of an eBook Kotobee (2014)

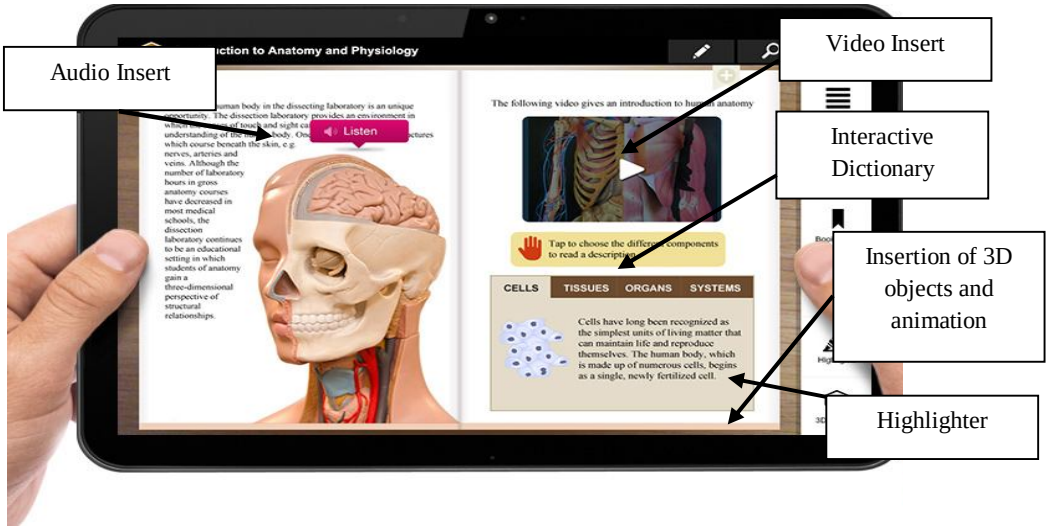


Figure 1 shows an authoring tool that allows insertion of audio and video clips, an interactive dictionary, insertion of animation, highlighter, taking of notes, doing exercises as well as exporting the application to android devices, iPads and iPhones, etc. as a handheld application. All these interactive features are geared to allow the individual learner to interact with the content and learn.

In addition, while doing assignments or writing research papers students need to be able to refer to a number of texts simultaneously. This means they need to open multiple texts, each in its own window, at the same time. For such features, the Princeton University (2010) reports:

> **"**Asking students what improvements could be made to an e-reader to facilitate effective note taking, study, and research tools, the same features mentioned in other places were again foremost – improved PDF support (for highlighting and note* taking), improved annotation, the ability to have more than one document or book open at once, the ability to compare passages, support for skimming, or rapidly flipping through pages of a document, and had organizational tools, such as folders, so that notes and readings could be kept together.**"** [p.25]

This need and concern of students points to a student-centric approach that was previously overlooked by manufacturers of the technology. MacWilliam (2013) therefore concludes:

> **"**As further developments are made and new ebook devices are released, understanding has to be given to a human-centered approach that will help to better the design of ebooks and best utilize the technology. Although publishers cannot affect the technology on which the device is read, they can affect the contents and further enhance the reader's experience. The publishing industry needs to think innovatively and use a human-centered approach to development that will allow them to design for more engaging experiences.**"** [p.10]

What is a human-centered approach? It is a design approach that serves the needs, tastes and habits of readers in this case. The design approach discussed so far looks at both content and technology. The respondents in the Princeton University (2010) survey also talked about their "learning" habits and the need to incorporate support features to cater for such habits. This leads us to think more about how ebooks can be used to support classroom teaching-learning practices and in particular active learning encouraged by teachers and demanded by instructional designers.

Active learning:

It has now been well established as earlier pointed out by Zull (2004) that students learn when they actively think about, *i.e.*, offer their own ideas on the subject and progressively improve on their ideas. To do this, students need a forum to discuss their ideas and improve upon their concepts. They learn via making mistakes and improving their concepts. So for learning, students need to know which ideas are wrong, why they are wrong, as well as which are right, why they are right. This can be achieved through peer learning as quoted below.

> **"**Peer learning is seen by social constructivist theorists as an effective means for students to gain deeper understanding of new concepts through informal and formal means. The interaction between peers allows students to enter the 'zone of proximal development' where a less able peer is able to enter a new area of potential development through problem solving with someone more able (Vygotsky, 1978).**"** (As cited by the Institute of Teaching and Learning Innovation, 2015).

Similarly, peer learning is now increasingly being recommended by the teaching learning centers of universities around the world. At tertiary level gaining mastery of the subject is essential so that it can be applied in the real world. The question is do eBooks allow peer interaction facilities for active learning, in particular, for academic textbooks?

While asking to read books available as eBooks, it would be useful if a teacher could ask students to discuss particular paragraphs, concepts, examples while reading on their own (Richards, 2012). Ebooks have the opportunity to provide a platform for collaboration between students and allow peer learning.

Gap Analysis

Current Interactive eBook technologies and design literature

More recently, as reported by Fenwick et.al. (2013) Apple released the free iBook Author application during January, 2012 for the iPad mobile handheld device. As reported by Fenwick (2013), Langer (2012) describes the features of the iBook Author application as:

> **"**The iBooks Author application supports a wide variety of content types including text, images, shapes, tables, charts, and interactive widgets. Each content type has changeable characteristics, such as text font size, shape color, etc. The content types can be placed anywhere on a page. A number of interactive widgets are available including image galleries, audio media (m4a format), video media (m4v format), slideshow presentations, multiple-choice review questions, an "interactive image" that supports image zooming and labeling, COLLADA format 3-D objects allowing the reader to manipulate the object, and embedded Dashcode HTML.**"** [p.2]

Using these technological features, Fenwick et.al. (2013) report on how they developed a highly interactive eBook for teaching students the fundamentals of a Computer Science language Prolog. While it was possible to link to external quiz and grading systems, the application itself did not have means of monitoring whether a student is actually using any of the interactive tools. It is important to monitor student engagement or participation as a part of good teaching practices. Monitoring, however, requires that the teacher be able to "see" what the student is doing. The technological questions are *how would a teacher see what the student is doing if the responses are stored locally in the tablet? How would the teacher get access?*

Colombo, Landoni & Rubegni (2014) go a step further and involve children to help design "engaging" ebook features. As a result of their research, they give the following 6 design principals using comments from the children to prepare their design principals.

1. "It (i.e. the eBook) should not be 'boring'": use audiovisual enrichments to allow for different reading paths
2. "It should have a touch of 'Pathos'": provide read – aloud narration of the text
3. "It should be playful": use interactivity to add value to the eBook and make it more playful.
4. "It should not be too difficult to read": provide in-line dictionary definitions and illustrated descriptive cards
5. "It should be colorful": use colors to differentiate the various parts in the text
6. "It has to remain a book though": use non-textual elements with care and moderation

All these design features have more to do with interface design rather than getting students to embark on a path of active learning. So while the design features would work to make fiction more enjoyable, we need features that would allow peers to discuss academic texts and collaborate on problem solving, *i.e.*, learning that is required in higher education settings.

Pedagogical Features

With academic texts a teacher should be able to monitor student activities, also a teacher may want additional pedagogical features or instructional design support from a particular ebook that the teacher is using as a textbook for his/her course. Additional pedagogical features may include employing active learning strategies to engage with particular content in the textbook. Prince (2004) reviewed the forms of active learning strategies used in engineering classes which include collaborative learning, cooperative learning and problem-based learning (PBL). With the exception of PBL which may also have an element of self-directed learning, all active learning strategies involve some sort of interaction with peers, resources (textbooks, self-assessment quizzes, laboratory equipment, learning games, etc), teachers or experts. Such activities online may take the form of discussion, comments, feedback, etc. – all of which need purposely built spaces where such interaction can take place either off-line or online. The interaction needs to be tied to the content in question.

The teacher, being the assumed expert, would know which parts of a concept need to be discussed so that students could actively engage through discussion and make the required learning connections. Making such connections is essential for learning as the neuropsychology experts have also shown by research in their revised book (Caine & Caine, 1994). They also advocate a non-threatening motivating environment, which social networking sites allow.

So, a subject teacher may feel that it is essential to discuss and understand a particular diagram or a particular section of text in an academic ebook being used a textbook. The teacher may also want to follow the discussion either actively or silently or even give a formative feedback at the end of a discussion. The question is what functions/facilities of an academic ebook would allow a teacher to do this? Certain steps would be necessary.

- The teacher would need access to the diagram or part of text in the ebook.
- The teacher should be able to assign a discussion task by writing a question for the text or diagram
- The task should be accessible to a particular batch of students taking the course
- The students should know what tasks are given on the diagram
- They should be able to comment, discuss and see all other posts on the text or diagram
- The teacher should be able to assist the discussion, give formative/cumulative feedback and also assign marks if planned and announced.
- If assigned by the teacher, the system should be able to automatically give participation marks based on authentic participation.
- The individual marks and feedback should be accessible to the student.

Such features represent a paradigm shift in the way academic ebooks are downloaded and used in personal hand-held devices. To allow such functions to exist in and integrated into academic ebooks, the ebook text must be held in a website and work interactively with the personal hand-held device rather than being entirely downloaded and stored locally with the multimedia features.

eBook Features needed

The eBook design would essentially need to allow interactivity on each diagram or line/sentence/paragraph of text. This means that each diagram or part of text would have to be uploaded separately on the server allowing task setting, peer discussion, comments, feedback, self-assessment questions, marking scheme, grading, animation, video and audio. Handheld Ebook readers would allow logging in to the website and after authentication allow all the student activity, interactivity and interactions. It would keep a log of all student activity. This would allow teachers to monitor the activity and provide feedback when needed who would also have to login.

Roles and Interactions

The stakeholders, interactions and potential services are shown in Fig.3. The publisher would provide the website services where all the eBooks would be created and maintained with all the services. The publisher would solicit authors or textbook writers to either convert their existing textbooks to eBooks or contract to write new books. The publisher would engage the instructional designer to add/suggest pedagogy, interactivity and engaging features.

The publisher would then allow teachers who wish to use a particular textbook to register batches of students. Students would register and do all the assigned work with the textbook. Publishers may even have bulk contracts with universities to provide text eBook services.

Proposed eBook Development Model

All this points to the need for an overall eBook development model which publishers and authors can refer to adopt their particular features for the market they wish to address. The model would be three-pronged, i.e. it would involve an integrated approach with

- Content
- Technology
- Pedagogy

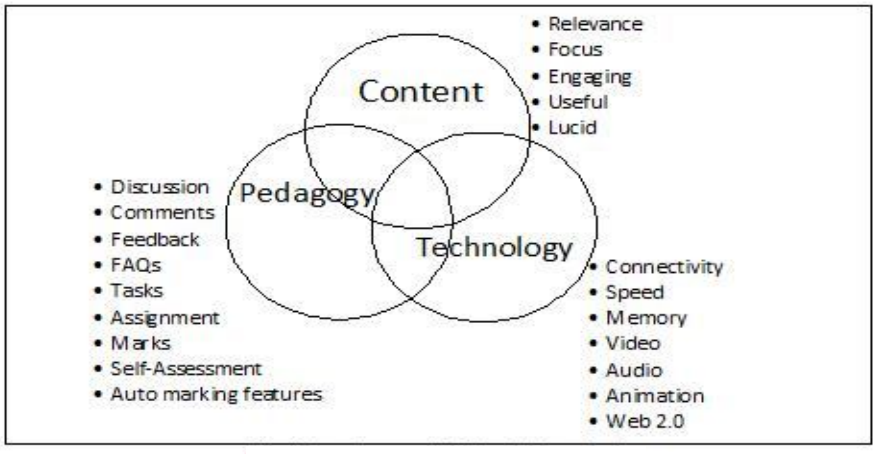
The content must obviously be useful and written in an interesting manner that lends itself to a variety of interactive activities. The technology would support all interactive and pedagogical activities. And of course the pedagogy would involve active learning design features which an instructional designer should be able to built-in. The types of people that would be involved in publishing and using academic eBooks would potentially be

- Authors
- Publishers
- Instructional designers
- Teachers
- Students

Those involved with the technology would have to cater to the needs of the all the stakeholders. The publishers and author will collectively decide which market they are aiming for. The eBook Development Model shown in Fig. 1 is meant as a starting point to think about the issues involved in publishing an eBook.

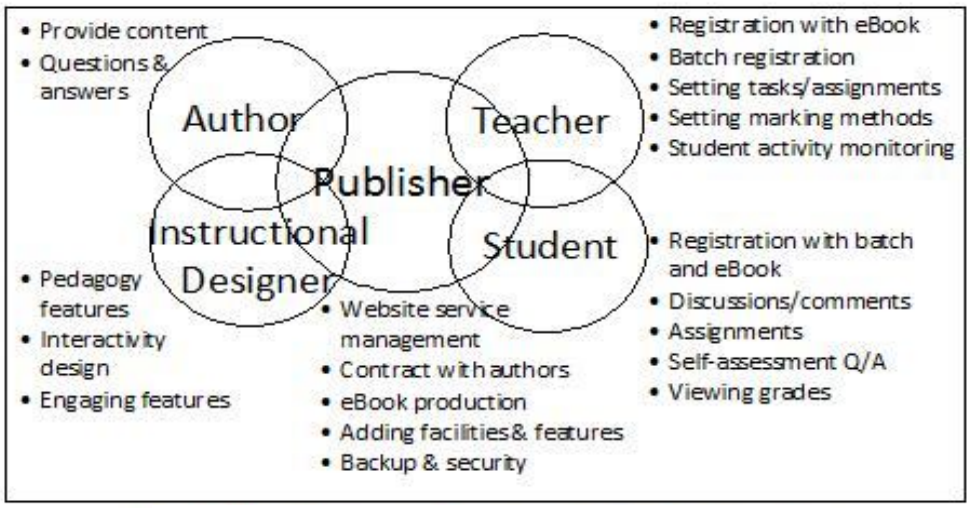
Preliminary ideas for each of the three areas, content, technology and pedagogy are given in Figure.2. With this model the roles of the stakeholders has also to be reassessed.

Figure 2. Developmental model for ebooks



Source : Developed by authors

Figure 3. Interrelationships and roles of the various stakeholders



Source : Developed by authors

Conclusion and Implications

As discussed, to provide active learning features the eBook would have to be hosted in a publisher website accessible by both teachers and students, as opposed to being downloaded in a local eBook reader. The design should allow a full range of pedagogical features such as peer discussion and monitoring. This is needed certainly for e-textbooks used by higher education institutions. This would allow textbook activity to be not only guided but also monitored but giving the necessary feedback. Currently, tablet PCs have become very popular with university students. Students use these to read textbooks in the form of eBooks, which are mostly pdf files shared between classmates or passed down from seniors. Such sharing leads to loss of potential revenue which can be avoided by using a web-based eBook service to which teachers and students have to login. Each student logging in would pay a nominal charge or use the bulk membership facility enjoyed by the educational institute.

The research has used secondary sources for data. For further clarification, a prototype can be built and tested. Existing technology can easily accommodate the changes proposed. The design features recommended exist in other forms, but not necessarily for e-textbooks.

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