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Solution for Digitizing Educational Curriculum

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Abstract: *In today's world, almost everything is converging to be "Digital". Even the government of India has recently started to give a lot of importance to digitizing various tasks and processes with the launch of "Digital India" mission to integrate the government departments and the people of India. Even our educational institutions have started to implement various digital initiatives at different levels most popular among these being the "Smart Classes" which have enhanced teaching and learning experience. In this direction of digitizing educational institutions, a lot of other initiatives have surfaced from time to time. One such initiative worth mentioning about is "Aakash Tablet" [1] promoted by Government of India as part of an initiative to link 25,000 colleges and 400 universities in an e-learning program. This tablet is manufactured by the British-Canadian company DataWind. Additionally, a lot of devices and applications are available and lined-up in the market today which makes your regular tablet work as an E-reader. The E-reader [2] is a specialized tablet which restricts users to do anything else other than reading books / periodicals. "Kindle" from Amazon currently leads the market of E-reader devices followed by "Nook" from Barnes & Noble.*

Taking this concept forward, this research paper focuses on creating a niche solution for educational institutions whereby the E-Reader is refined and molded into a new device to address the concerns / requirements of an educational institution.

We have named this device as "enk". The research paper talks about various features incorporated in "enk" and how it will be used by institutions and students for their academic routines.

Key Words: E-reader, Digital Book, Tablet, Educational Readers, School Tablets, Digitization of book, eBook

1. INTRODUCTION

The objective of this research is to replace the existing paper based infrastructure with digital content and devices, packaged in a single comprehensive solution, with minimum impact on the user experience as well as the current academic procedures.

Currently we do have both digital content and devices available and in use by some institutes as well, the objective of this research paper is it go a step ahead by combining the existing digital content and devices to formulate a niche solution which has minimum impact on the user experience and retaining the existing academic procedures. The solution not only replaces the curriculum content coming from different publishing houses but also the content generated by Academicians, thus giving a full 360 degree coverage and replacement of paper based infrastructure.

2. RESEARCH ANALYSIS

The first step in our research is to analyse the current paper based curriculum. In this phase we analyse different types of curriculum prescribed at different levels. We gather information regarding:

- Source & owner of the curriculum
- Methods used to dispense and absorb the curriculum
- Supporting activities performed during the course like writing in different subject specific notebooks, sharing the information among Students and Teachers, evaluation of the information absorbed by the students etc.

While doing this analysis, we came across the below listed features expected in an e-reader:

- Device locking, whereby students can only access content that has been published for them
- Creating new "Notebooks" whereby students can create "Notebooks" and link them to different subjects they are studying
- Writing into these notebooks using stylus
- Intranet connection with the institution and other students to share content
- Fetching the content from different publication houses and educational boards at central and state levels and pushing the same to selected devices

- Equipped with Mechanical charger to charge the device whereby students can charge the device manually in situations of emergency
- Auto-save feature wherein as you write in the notebook, data gets saved and is synched to the institutions server (whenever the device is connected to the institution intranet)

In the past, research has been done in trying to analyse the benefits of eBooks. A white paper published under the titled "*eBooks – Costs and Benefits to Academic and Research Libraries*" [3] talks about the costs of eBooks vs. print books as depicted in *Fig. 1[3]*

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In another research under the titled "*What Do Faculty and Students Really Think About eBooks?*" [4], talks about a research study carried to capture the benefits of eBook. In this study, the participants rated 11 potential eBook benefits on a scale of one to seven. Enhanced user access, enhanced functionality, and access to greater amounts of content areas all scored highly as areas in which eBooks provided clear advantages over print publications to all participants as depicted in *Fig. 2 [3]*

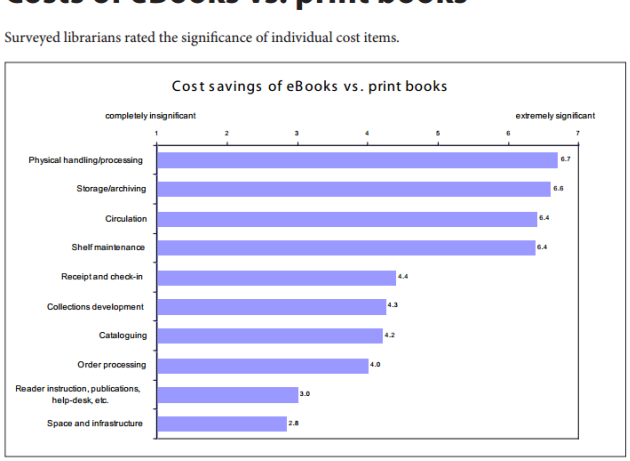

Fig. 1: Costs of eBooks vs. Print Books [3]

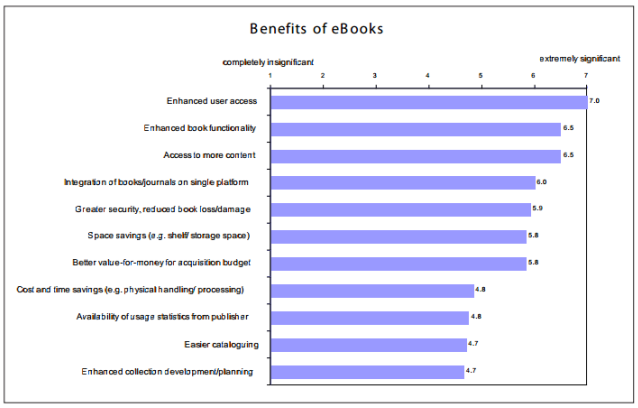

Fig. 2: Benefits of eBooks [3]

3. Proposed Solution

Based on the analysis done and the needs identified, we have formulated a solution whereby the current e-reader is refined and moulded into a new device.

We have named this device as "*enk – Digital Book*". Below are the proposed technical specifications for this device:

Dimensions (unfolded)	Width: 17 inches Height: 11.5 inches Thickness: 0.24 inches
Weight	500 g
Battery	3000 mAh li-po battery
Display Resolution	800× 480 Pixels
Touch Panel	Capacitive
Processor	Cortex A7 Dual Core; 1.2 GHz
PRAM Memory	512MB
Internal Storage	4GB
Expandable Storage	32GB
Operating System	Android Lollipop 5.1

In fig. 3 [5] below we showcase a prototype of this device:

Fig. 3: Prototype of enk – Digital Book [5]

4. FEATURES:

a. **Security**: Once booted, the first screen that comes up on the device is a "Login" prompt wherein the student needs to enter his/her credentials to access the device. In case a student forgets his/her credentials then the device can be unlocked by the Admin

b. **Access to ONLY admin published content**: Students can access on the content published for them by the Admin. Thus bringing focus and attentiveness similar to the current environment of teaching. But Admin is free to publish multimedia content relevant to the curriculum

c. **Durability:** The entire device would be wrapped in a thick rubber cover providing necessary durability and sturdiness.

d. **Tile windows functionality to access multiple books:** The user can use the "Tile" functionality very similar to the one available in MS Windows whereby multiple books can be opened and tiled either horizontally or vertically.

e. **Feature to create and link "Notebooks":** User can create "Notebooks" which have a UI very similar to a paper based notebook with the rules and margins. These notebooks can be linked to the different subjects as required. So basically forming a collection of textbook(s) and notebook(s) for each of the subject.

f. **Pen-like Stylus to write in "Notebooks":** User can use the stylus provided with the device to operate the device as well as write in the books just like writing with a pen. User can also change the text color of the Stylus as needed. The Stylus can also be used to annotate in text books.

g. **Auto-save content:** As the user writes into the device, the content is auto-saved very similar to the way it just gets auto-saved in a normal notebook. Thus the user never needs to explicitly save the content as required by normal word processing software's

h. **Intranet connection via Wi-Fi:** The device has a built-in Wi-Fi which automatically gets connected to the intranet Wi-Fi of the institute as configured by the Admin.

i. **Data Backup:** Once the device is connected to the institute intranet Wi-Fi, the data is backed up to the central server automatically in the background. Thus in case of device lost or damaged, the last backed up data is always available and safe.

j. **Ease in assessing content by Teacher:** The Teacher, as needed, can anytime access the content of each individual student whereby the last synched data from each students device is available for the Teacher to review / assess.

k. **Sharing content among students:** The Students can share content among themselves using the Wi-Fi direct functionality in the device.

l. **Mechanical Charger:** The device has a built-in mechanical charger which can be used by the users to charge the device in case of emergency

m. **Cost effective**: With the removal of unwanted features available in a normal tablet like front and back camera, Bluetooth, high-powered processors and memory mostly used to play high resolution graphical games, the cost of this device can be drastically reduced as compared to a normal tablet.

Below fig.4 depicts a high-level adoption flow in regards to how the device would be adopted and used by different users in an academic institute

Fig. 4: Adoption Flow of enk-Digital Book

5. LIMITATIONS

a. **Adoption by institutes:** Shifting from the current pen-paper based methodology to the Stylus based digital writing

b. **Physical wear and tear:** The device is bound to physical wear and tear and damage / loss. This is similar to the paper based wear and tear but the cost involved in replacing a damaged / lost enk-Digital Book would be much more than replacing a single text book / notebook.

c. **Energy needs:** The device would need electricity to run. Although its equipped with mechanical charger but still the majority of the power would be coming from the power outlets

d. **Sharing only via Wi-Fi**: The content can only be shared via Wi-Fi. Thus limiting sharing among users far apart via internet.

e. **Compatibility with differently abled Students (like Blind):** The device would be hard to use for differently abled students like Blind etc.

6. CONCLUSION

The e-reader in its current form needs to go through a series of transformation to be adopted by different types of users. May be the current e-reader device is equipped to satisfy the needs of a generic book reader but for a student it needs to cater to the requirements and specifications of an educational institute.

This research paper lists down the specific needs of an educational institute and proposes a transformed e-reader device called “enk-Digital Book”

As enk-Digital Book device is used by different institutes, it can be further transformed and moulded to adhere to different procedures and needs of an educational institute.

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BIOGRAPHIES

Harpreet Singh Padda did his MSc. in Computer Science from University of Mumbai in the year 2004. He has more than 12 years of experience working on .Net and web technologies like HTML, jQuery, Javascript and other. Currently he is pursuing PhD in Computer Science from JJT University