Amazon in Education: There’s smoke but is there fire?

Commissioned by Intel® Education
Executive Summary

Amazon released the first generation of its Kindle ebook reading device in November of 2007 and it sold out in less than 6 hours. Since then, millions of Kindles have been purchased and it is estimated that Amazon sales account for nearly two-thirds of all ebook readers\(^1\). Educators and public libraries were quick to embrace the Kindle as a tool to help foster student engagement and get more kids reading\(^2\). Despite releasing more than ten different versions of the Kindle device\(^3\) and selling millions of digital books to schools, Amazon has been wary, at best, to engage directly with the K-12 education market – at least until now.

Over the past 18 months, Amazon has steadily and notably increased its presence in K-12 and has rolled out and/or purchased a number of different tools, resources, and solutions. These include:

- Launched a dedicated Education and Enterprise Sales web page at www.amazon.com/education (including dedicated support staff for educators using Kindles);
- Created Whispercast, a device management and BYOD program support tool;
- Purchased TenMarks, a math curriculum company;
- Introduced the Kindle Fire HD and HDX (with an operating system based on Android) that includes a robust app ecosystem and enterprise security capabilities; and,
- Hired a former Microsoft executive to lead education and enterprise sales and is aggressively hiring staff with education market experience.

These new education-specific efforts supplement an already formidable set of consumer and IT offerings that make Amazon unique among any organization selling into education. Generally speaking, these existing offerings can be divided into four categories:

1. Infrastructure tools and Amazon Web Services (“AWS”);
2. The Amazon digital storefront;
3. Branded devices like the Kindle; and,
4. Amazon branded software and services including Audible.com, Amazon CloudPlayer, etc.

Although none of their education-specific efforts in-and-of themselves signal an all-out move into the education market, taken together with existing solutions they suggest Amazon is beginning to marshal this new set of education tools, resources, and solutions (i.e., Whispercast, TenMarks, etc.) along side their existing offerings (AWS, CloudDrive, Amazon AppStore, etc.) to be much better positioned to complete with Apple, Google, Intel, and other OEMs and education solution providers for RFP and other education dollars.

---

\(^1\) [http://en.wikipedia.org/wiki/Amazon_Kindle](http://en.wikipedia.org/wiki/Amazon_Kindle)


\(^3\) Including Kindle, Kindle 2, Kindle DX, Kindle DX Graphite, Kindle 3, Kindle 4, Kindle Touch, Kindle 5, Kindle Paperwhite, Kindle Fire, Kindle Fire HD, and Kindle Fire HDX.
Moreover, in light of the fact that Amazon has a large and active audience of over 230 million active global customer accounts with an average of over 14 million visits from the US per day supported by in excess of 95 thousand employees, Amazon's lack of a more significant presence in the K-12 education space is unique amongst all the large technology companies.

In addition to these broad shifts and capabilities, Amazon also has a significant number of near term opportunities that they could grow and expand to reach more into the education space. These include:

1. Expanding the capabilities of the cross-platform Kindle app. Currently, the app links with Amazon accounts and can be managed using Whispercast, but it offer limited collaboration and few analytics;

2. Creating an education-version of the “Free Time” app that allows teachers to regulate access, time, and apps (much like parents can use the Free Time app); and,

3. Working more closely with school IT departments to provide customized AWS solutions for server virtualization and data warehousing using AWS solutions.

Despite all of these efforts over the past few months, there are a number of gaps and issues with Amazon's current offerings. These include:

• A lack of any learning analytics system aside from what is included in their math curriculum, TenMarks;

• Limited functionality in some of their of their offerings. For instance, Whispercast is “headed in the right direction” as a BYOD/MDM solution but has a long way to go before it's a viable solution for most school districts; and,

• Potential concerns with student data privacy and terms of use that meet FERPA and COPPA requirements in the US.

At present, Amazon is, essentially, a sleeping giant in education. As this paper shows, they have created a number of solutions that, if adapted or scaled for education, could outstrip many of their competitors. Should they decide to go “all-in” with a set of more robust solutions and offerings Amazon will have an incredible disruptive impact on the ed-tech space – potentially as significant as the shifts that Chromebooks and iPads have wrought over the past five years. In our research, we have found no reason to conclude that they have a plan or timeline in place to “go big.” Rather, should they decide to do so, they are very well positioned.

4 Amazon Investor Relations  “Amazon.com Announces First Quarter Sales up 22% to $16.07 Billion”, March, 2013.
5 For instance, see Amazon's work in Brazil at http://blogs.edweek.org/edweek/marketplacek12/2014/04/Amazon's_Brazilian_Textbook_Deal_Stirs_Speculation_About_Things_to_Come.html to distribute textbooks using the Kindle app.
Since Amazon is approaching education from multiple angles (devices, curriculum, and services) there are a number of potential opportunities for Intel to complement their efforts. Any partnership between Amazon and Intel is, of course, complicated by the fact that all Kindle devices uses ARM-based processors. As such, these potential opportunities include:

- Supporting enhancements and further roll-out of the AWS solutions into the K-12 space. AWS uses Intel Cloud Technology and while Amazon has been working very closely with higher-ed to help them use Amazon Web Services, K-12 has been very slow to move information to the cloud. In particular, Intel could help support and advice Amazon on many of the security and data privacy issues that are paramount to K-12;

- Development of Kindle Fire-specific apps to support learning or collect student data analytics;

- Creation of teacher professional development materials and/or student curriculum in different subject areas to complement the math curriculum in TenMarks; and,

- Support the expansion of the WhisperCast BYOD tool by partnering with Amazon to enhance its features and make it work better with iA devices.

The remainder of this white paper details the current state of Amazon and their efforts in education including their many strengths and weakness as well as some possible opportunities to pay attention to in the coming months.
# Table of Contents

Executive Summary 2  
Background 6  
Kindle Product Line Comparison 7  
Using Kindle Content With Other Devices 8  
Device And Technical Considerations 8  
Kindle For Education 11  
Whispercast 11  
Non-Kindle Managed Devices 17  
Amazon-Purchased Content 19  
Education Apps 20  
Tenmarks 21  
Amazon Web Services 24  
Kindle Devices In Educational Settings 25  
Informal Education Applications 27  
Legal Considerations 28  
References 30
Background

Most people think of Amazon’s line of popular Kindle products as a strictly an ebook reader: a tablet device that is designed with a highly readable screen (especially in bright sunlight) with a longer battery life than a typical tablet. The face and use of ebook readers however, has changed radically since their introduction and now range from use-specific and fairly limited e-Ink readers (e.g., the Kindle or Kindle Paperwhite) to touch tablets with color displays, multiple apps, and audio/video capabilities (e.g., the Kindle Fire line of products).

The competition with tablets has crowded the ebook reader market and 2012 saw a 28% decline in e-reader sales worldwide. Due to this increased competition, ebook readers have expanded to look and act more like a “full” tablet device; many using the Android operating system underlying the e-reader platform. At present, the term “ebook reader” generally encompasses four classes of products:

1. **Black-and-white e-ink readers** ($69 to $149) generally limited to reading EPUB, AZW, or PDF books and files;
2. **7-inch color LCD media tablets** ($150 to $300) that feature e-reading and support an app ecosystem;
3. **Midsize color LCD tablets ranging from 7.9 to 9 inches** ($269 and up) that may support apps, watching movies, gaming, etc.; and,
4. **Full-size color tablets similar to the iPad** (mostly $400 and above) with an e-reader app featured/installed.

The major players in the ebook reader market are Amazon with their Kindle devices, Apple with iBooks on iOS devices, Barnes & Noble with the Nook, and Google with the Google Play Books e-reader for Android devices. Other providers such as Kobo, Samsung, and Sony and a few other tablet manufacturers have a comparatively small share of the market.
## KINDLE PRODUCT LINE COMPARISON

The Amazon Kindle product line includes seven ebook readers that span a price and feature continuum, although internally they refer to the three initial products as Kindle readers, and their four higher end products as the Fire line (and which they do not label as e-readers, but instead market as “powerhouse tablets”).

<table>
<thead>
<tr>
<th></th>
<th>KINDLE</th>
<th>KINDLE PAPER-WHITE</th>
<th>PAPER-WHITE 3G</th>
<th>KINDLE DX</th>
<th>KINDLE FIRE HD</th>
<th>KINDLE FIRE HDX 8.9</th>
<th>KINDLE FIRE HD 8.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>$69</td>
<td>$119</td>
<td>$189</td>
<td>$139</td>
<td>$229</td>
<td>$379</td>
<td>$299</td>
</tr>
<tr>
<td>Screen Size</td>
<td>6”</td>
<td>6”</td>
<td>9.7”</td>
<td>7”</td>
<td>7”</td>
<td>8.9”</td>
<td>8.9”</td>
</tr>
<tr>
<td>Processor</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Dual-Core 1.5 GHz</td>
<td>Quad-Core 2.2 GHz</td>
<td>Quad-Core 2.2 GHz</td>
<td>Dual-Core 1.5 GHz</td>
</tr>
<tr>
<td>Resolution</td>
<td>167 ppi</td>
<td>212 ppi</td>
<td>150 ppi</td>
<td>216 ppi</td>
<td>323 ppi</td>
<td>339 ppi</td>
<td>254 ppi</td>
</tr>
<tr>
<td>Connectivity</td>
<td>Wi-Fi</td>
<td>Wi-Fi</td>
<td>3G</td>
<td>Dual Band Wi-Fi</td>
<td>Dual Band, Dual Antenna (MIMO) Wi-Fi, 4G</td>
<td>Dual Band, Dual Antenna (MIMO) Wi-Fi, 4G</td>
<td>Dual Band, Dual Antenna (MIMO) Wi-Fi, 4G</td>
</tr>
<tr>
<td>Storage</td>
<td>2GB</td>
<td>2GB</td>
<td>4GB</td>
<td>8GB</td>
<td>16GB</td>
<td>16GB</td>
<td>16GB</td>
</tr>
<tr>
<td>Optional Internal Storage</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>16GB</td>
<td>32 GB/64 GB</td>
<td>32 GB/64 GB</td>
<td>32 GB/64 GB</td>
</tr>
<tr>
<td>Landscape Mode</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Touchscreen</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Parental Controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Apps, Video, Camera And Streaming</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>E Mail</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Music, Photos, Audiobooks</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

---


8 [https://support.google.com/chromebook/answer/3723447?hl=en](https://support.google.com/chromebook/answer/3723447?hl=en)
USING KINDLE CONTENT WITH OTHER DEVICES

In addition to the Kindle devices, there are two other ways to access Kindle-specific content: the Kindle App and the Cloud Reader.

The Kindle Reading App (device-based app) is available for Windows 8, Windows 7, XP and Vista, Mac, iOS and Android. Just as on a Kindle, the app allows users to highlight, take notes, search within the text, on the web or on Wikipedia, look up words, start reading the books from the previous spot, and personalize their reading experience by changing the size of the text and background colors. The app is available both on and offline; however, not all features, specifically the search features, function in the offline mode. The Kindle app allows non-Kindle users to participate in a BYOD version of Kindle's Whispercast-managed content, as discussed in the sections below.

The cloud reader (a cloud-based app) is available for Internet Explorer, Chrome, Firefox and Safari web browsers, but does not allow users on Android devices to access the reader. It is advertised as being an identical experience to the Kindle app, but preliminary testing has shown that the offline features are clunky and problematic. Testing and internal discussions did not lead to any potential use for the cloud reader in an educational environment.

DEVICE AND TECHNICAL CONSIDERATIONS

Battery Life

As Amazon has released product improvements and new devices, overall battery life has increased. On average, Kindles Fire devices have batteries that will last from 7-10 hours – allowing them to last an entire class day on a full charge.

Charging Issues

Charging issues seem to be the most common failing for the Kindle Fire devices. Issues range from the battery rapidly losing charge, the charging port being loose, the device indicating it is charging though it is not, as well as extremely slow charging rate. Some customers have to keep their Kindle Fire plugged in in order for the device to stay on. Amazon does replace Kindles that will not hold a charge; however, some customers have had theirs replaced upwards of four times after experiencing the same problem. Reportedly, Amazon will not upgrade customers to newer devices, or refund the full amount, but they will credit accounts $100. Many people are very frustrated with constantly having to contact Amazon for the same issue on multiple devices.

Amazon’s user forums include have a great deal of conversation reflecting these charging issues including items such as:

- The charge indicator comes on but the device isn't charging (seems to be due to an overly sensitive port on the Kindle);
- Issues with the battery indicator reporting inaccurately (seems to be “fixed” through a hard restart, but first you need to know you are getting bad data);
• A fair amount of discussion about 3-4 month old Fire HD devices that quit charging and have to be returned; and,

• Using the device while charging slows it significantly.

Each Kindle device has a different combination of cables, adapters and notifications for battery use and charging. Adding a blue tooth keyboard exacerbates the issue as the keyboard must be charged separately. The Amazon Kindle information site\(^7\) says the Fire HD should charge in 4 hours with the “fast charger” (a 5V/1.8A adapter available for $20), and about 11 hours through a USB to a computer. In testing on one HD Fire, the device did not fully charge even after 12 hours (powered off) when plugged into a wall with a standard USB adapter (5v/1A). When using the device while charging (just reading, no wifi or Bluetooth) the discharge is faster than the charging causing it to go dead even when plugged in. Testing with the Kindle-supplied fast charger resulted in a 5% increase in charge (50% to 55%) in one hour with the device switched off.

**Overheating**

Many customers have reported overheating of their Kindle Fire during game play (especially games with a lot of color and animations), watching videos and even surfing the web. Some devices have had to be sent back to Amazon for replacement because the device gets so hot that it turns off. Some people report overheating during charging as well leading to the potential of the charger melting (similar to an issue reported by HP’s Chromebook 11).\(^8\)

**Uneven Lighting**

Many customers using the Kindle Paperwhite have complained of uneven screen lighting when in dimly lit rooms. Amazon acknowledged the problem in October 2012 saying that it only affected a small area on the bottom of the screen where text was not located. They did not offer a fix; instead they tried to reassure customers that the blotchiness was normal.

Other issues have been reported in smaller numbers including: issues with the device being unresponsive and freezing up, problems connecting to Wi-Fi, a blue or purple haze on the screen, flickering screens, and sound issues after connecting headphones to the Kindle.

---

\(^7\) Both PARCC and SBAC require a minimum screen size of approximately 10”
Kindle Customer Support

Customer support for the Kindle line is in four tiers:

1. Online posts: Amazon has a fairly robust set of technical support postings that are relatively user-friendly and informational;

2. Online forums: Amazon does not officially moderate these forums and users are asked to self-police and to provide peer-to-peer support;

3. Email, text or call for customer support: random testing of each of these resulted in almost immediate responses through each of the venues; and,

4. The Kindle Fire HDX (most expensive model) also comes with a “Mayday” button that allows users to connect 24/7 to a tech specialist through a videoconference. The user sees the technician, the technicians sees only the user’s screen. The technician can draw on the user’s screen to show them features, and can walk them through the support issue. Mayday is only available in English, but can be accessed internationally.

Items 3 and 4 above make Kindle devices attractive to teachers who need quick and responsive support for classroom use. While iPads and most Android tablets offer much of the same support (chat, phone and email) the Mayday button is great for immediate response. Unfortunately it is only available on the Kindle Fire HDX which may be out of the price range of many schools. The Mayday option will not be added to other Kindle devices because they don't have the correct hardware for implementation (microphone, etc.). However, for schools that do purchase Kindle Fire HDX devices, the Mayday button may be a great service to provide technical support and configuration for both teachers and students.
Kindle For Education

Amazon has been actively pursuing the education market since 2012. The recent launch of Whispercast™ makes the classroom management of Kindle devices extremely easy: teachers can register the devices in a "batch" and then be able to control multiple functions including pushing content to individuals or groups, and restricting social network access while allowing other internet access.

While the screen size of even the largest Kindle device is currently too small to meet the PARRC or SBAC requirements, Amazon has made it easy and fairly inexpensive to set up a student with a full-color, app-ready Kindle Fire HD and a keyboard for less than $200. While the Kindle e readers are seen as a nice-to-have addition for classroom reading, the more advanced devices (e.g. Kindle Fire HD) are more appealing to educators as multi-use devices that can use media for classroom projects, easily access the internet, and support the use of educational apps.

WHISPERCAST

Amazon's Whispercast service is a web-based tool developed for business and educational use, that provides one-to-many content and hardware management for Kindle devices and other devices using the Kindle app. Its significant features for educational settings include distribution of content to individuals and groups, and the management of devices through policy settings. Amazon's marketing promises strong support of BYOD as well as school-owned devices using the Kindle app, but as discussed below, the tool does not yet seem to deliver what teachers will likely need for widespread implementation.
Whispercast Educational Use Cases

Each Whispercast Account has an **Account Administrator** (typically the teacher, but this may be the school's IT manager or others). The Account Administrator must have an Amazon user account and password.

Whispercast is compatible with all Kindle devices and Kindle reading applications, including Kindle for PC, Mac, iOS, Android, Windows 8, and Cloud Reader. However, the list of features and general how-to's on Whispercast is divided by whether it is a **Managed User** account or an **Invited User** account, so the following information below is parsed into those two use cases.
MANAGED USERS

A managed user is someone who is using a Kindle or Kindle Fire that has been registered to the Administrator’s Amazon Whispercast account.

The Administrator’s permissions for managed users are described below, and include:

- Registering devices
- Assigning users to devices
- Assigning users to groups
- Pushing content to groups
- Setting policies

Purchasing

Managed User Kindles can be bought individually or through a school’s bulk purchase, and can be purchased through Amazon or through other venues. Regardless of where or how the devices were originally purchased, all content purchases for the Managed User Kindles must be made through a “One-click” account. Therefore, the Administrator must be set up to use Amazon’s “One-click” purchasing which requires a credit or debit card to be tied to the account.

Registering Devices

For a Kindle to become “managed” it must be registered to the Whispercast Administrator’s account. This can be done as a single batch registration or as multiple individual registrations. For all registrations, the Administrator uses the form provided inside their Whispercast account.

- Batch registration: All Kindles purchased simultaneously through Amazon are assigned a single Amazon order number. This order number is used to “batch register” the devices, tying them to each Administrator’s account. Therefore, if Kindles are going to be bought through a bulk purchase from Amazon, the devices for each Whispercast Administrator (e.g. each teacher) are optimally placed as separate orders—allowing each Administrator to easily register the devices on their Whispercast account.

- Alternatively, schools may choose to purchase all the devices in one batch, but that will mean that each teacher will have to enter and register each Kindle separately for their classroom.

- Individual registration: If devices are bought from a vendor other than Amazon, they can only be registered to the Administrator’s Whispercast by calling customer service at Amazon and having them added per device/serial number, incentivizing purchases through Amazon.

- Users: In addition to registering each device, the Administrator also has to set up a user account for each individual (or group) user. Each user account is established with a unique Amazon.com email and password, and is set up—free of charge—by the Administrator.
While setting up the user accounts, the Administrator also assigns a device to one (and only one) user account. Since the Administrator essentially “owns” all the user accounts, s/he is then able to manage all the devices through Whispercast.

Groups
Once User Accounts are set up and devices are assigned, each User must be assigned to one or more groups. Content can only be sent to a “group” (although a “group” can be a single person).

Policies
Device Policies can be applied per user group or sent to all Kindles in the Administrator's control.

Policies allow Administrators to:

- Block social network integration: Block access to social network use, such as Facebook and Twitter
- Block web browser: Block access to all internet connections
- Block store: Block access to the Kindle Store so students cannot make purchases
- Block factory reset & device de-registration: Prevent Users from restoring the device to the original factory settings (which removes all settings and content) or registering the device to another account (ensuring the device remains in the Whispercast Administrator's control)
- Block changes to Wi-Fi settings: Prevent Users from changing the wireless network that the Kindle connects to, this allows teachers to connect devices to a schools pre-filtered internet connection
- Require password on device: Ensure that only authorized Users have access to your Kindle.

![Create Restriction Policy](image)
In addition, Managed Devices can be automatically sent the SSID, Security Type (WEP, WPA, WPA2), password, and proxy settings for the school network, keeping that information private from the user. If/when those school-wide settings change, the Administrator can push the new information and the Kindles will automatically sync to the new data the next time they are turned on and in range of a wifi hub.

Device policies and network settings are not supported on Kindle 1st Generation, Kindle 2nd Generation, Kindle DX, and Kindle Fire 1st Generation. For those schools with Kindle Fire 1st Generation there is a workaround available using the device’s parental controls.

Content Ownership

All content (purchased or free) accessed through a managed device is actually “owned” by the user account, not the device. This is because each user account includes a cloud-based storage area that holds all of that user’s content. If a managed Kindle’s memory is too full, the least used content is automatically erased from the device—but is always available to re-load from the user account cloud account.

Bearing this in mind, the Administrator can set up user accounts as “generic” accounts (e.g. LincolnHigh01@amazon.com, etc.) or can tie the user account to an actual student (e.g. TonyaJones48@amazon.com).

At the end of a semester or school year, the Administrator can de-register the user account from the device, which will wipe the device memory. However, the content that was assigned to that user account remains in the cloud, tied to that account. This cloud-based archive would be very useful to students who are creating or collecting materials for an ePortfolio, which may be a culmination of several semesters or years of work (e.g. a Senior Project or a final degree presentation).

The generic user account can easily be re-used the following year, and re-assigned to any device (which will thus be “pre-populated” with the content that the user account already owns).

The student-specific account would only be preferred if that same student will be re-assigned a new device and the Administrator would like to provide access to the previous content.

Even though the screen size does not meet the current standard for online testing, the Managed User use case appears extremely useful for teachers whose schools can afford a “secondary device” for students. At a set up cost of less than $200 per student for the Fire HD plus a Bluetooth keyboard, it would be very appealing as an entry to 1:1 in the classroom.
INVITED USERS

This is the alternative that Amazon provides for schools supporting BYOD. Invited users may be using Kindles or other personally-owned digital devices which have loaded the free Kindle app and have set up an Amazon account. The Amazon site promotes this use as if it is an equivalent experience to the Managed Users but it is in reality very different.

The difference is inherent and immutable, because a Kindle (or a device using a Kindle app) can only be registered to one Amazon account at a time. Invited users must have an Amazon account to access content through their Kindle/Kindle app, but as a personally owned device it will (most likely) be registered to an Amazon account of the device owner. This means that—unlike managed devices—the Whispercast Administrator does not manage or own the device or it's content. This has ramifications through the entire set up and use model.

Users and Content

To include a BYOD user, the Administrator selects the “add user” option and selects “invited user” and then selects “create URL”. The Whispercast site then auto-generates a URL, which the Administrator emails to the student or owner of the device. Emailing the URL occurs outside the Whispercast account and requires the Administrator to have a school-issued or private email for that student or student's parents. The URL leads to a portioned area of the Administrator's cloud account, where s/he can upload free or purchased content for the invited user.

The URL is sent with an “invitation” to download content from the Administrator's account into the device-owners' account. This is a one-way, one-time move—it loads and stores the content into the cloud account of the person who owns the device and cannot be “returned” to the Administrator.

The same URL can be used for all invited users who will be assigned to the same group, but still requires the Administrator to purchase a license for each download.
Groups

When the Administrator is generating the invitation URL, s/he has the option of assigning that URL to a group. Students with personal devices may need to track several URLs, each of which is tied to different groups to which they are assigned (e.g. if they are in Group A for math, but Group C for reading).

Policies

There are no policy setting or network setting options for BYOD use. Students using their own devices will not have any limitations on the devices access (other than those established by the school internet filters), and will need to be provided the school's internet access information.

Due to the lack of the ability to manage these personally-owned devices and the cost of content that then is literally given away by the school, it seems that this BYOD “selling point” will not be of great benefit to Amazon and that this will be an unattractive option to teachers.

NON-KINDLE MANAGED DEVICES

For classes that already have school-owned devices (e.g. Chromebooks) Administrators can add the free Kindle app to those devices and set up user accounts that will act similarly to Kindle Managed Users. There are, however, no policy controls or network setting control available through Whispercast for non-Kindle devices. The advantage over BYOD is that the school/Administrator continues to own and control all the content in the user account. Since the schools' IT departments can instill the same level of management as on any other internet-able device, and the retention of any purchased content, the Kindle app may turn out to be the most attractive option for classrooms.

CONTENT

Whispercast allows teachers to easily deliver purchased and/or free content to all managed and invited users. There is no limit to the amount of content that can be loaded into each Kindle user account or provided to invited users, and there is no charge for teacher-provided content loaded through Whispercast. All content loaded through Whispercast is stored (per user account) in the cloud. If the device exceeds its storage capacity the least recently accessed content is bumped off the device and can be re-loaded when needed.

To re-use content on managed devices, Administrators need to set up the user accounts as “generic” (e.g. Grade3User1) and then pass on that same user name the next year. This approach is likely not as problematic for elementary grades, but will only work in secondary grades if each teacher in each classroom has their own stack of devices to hand out, as students will not have the same combination of classes from year to year.

There are three categories of content available for educators: Administrator-generated content, Amazon-purchased content, and Amazon-proprietary content.
Administrator Generated Content

All content provided by the teacher and delivered through Whispercast requires the Administrator to fill in a form with the name and owner of the material. Assumably this is to prevent them from purchasing an ebook or other proprietary material from another source and pushing it to multiple users without an appropriate license. Free content may come from public domain or creative commons sites, or be generated by the teacher or other students (e.g. syllabi, assignments, reports, background information, etc.).

Content can include books, apps in any of the following formats:

- Microsoft Word (.DOC, .DOCX)
- HTML (.HTML, .HTM)
- RTF (.RTF)
- Text (.TXT)
- JPEG (.JPEG, .JPG)
- Kindle Format (.MOBI, .AZW)
- GIF (.GIF)
- PNG (.PNG)
- BMP (.BMP)
- PDF (.PDF)

Content that does not fit into these file formats categories (e.g. apps or ebooks purchased from other sources) can be loaded onto Kindles by using the micro-USB port, but this requires loading content onto each device individually bypassing Whispercast and results in the content not being available in the user’s cloud account.
AMAZON-PURCHASED CONTENT

Purchased content is any material bought through Amazon's online store via the Whispercast Administrator's account. During the check-out portion of the purchasing process, Whispercast ensures that each User in the order has a compatible device, and will not distribute items that are either incompatible with the device or to any device registered to an account whose country of residence is outside of the U.S. Amazon has both k-12 and higher ed content available for educators and students.

K-12 Content

There are no known relationships between Amazon and the large school textbook publishers. It is probable that many publishers would see Amazon as a competitor, as many of them have their own ebook formats. Below is information on many of the major publishers and information on which books are available for the Kindle, if any, and their competitive products.

- **Houghton Mifflin Harcourt** - HMH offers many supplementary education books for ages 3-8, but there are no major course textbooks available in Kindle format. There do; however, have many ebooks available as well as a variety of web based platforms for many different curriculum areas.

- **Pearson Education** - Pearson also has eText and Mobile products, none of which are available for Kindle in the form of an ebook. Pearson has a number of digital curriculum products as well as an app for iOS called “Pearson eText for Schools.” The eTexts can also be accessed on Pearson's website.

- **McGraw-Hill** - McGraw-Hill has their own online learning systems, digital curriculums, apps and iBooks. Their ebooks are available on iBooks primarily, but they also have many apps that are available on Windows, iOS and Android. The McGraw-Hill ConnectED app is available for download on Kindle Fire devices, but there are no ebooks available for the Kindle app.

- **Scholastic** - Like the other publishers, Scholastic course textbooks are not available for as a Kindle eText. Scholastic does have some online curriculum, including a math and reading program, that are available online or on an iPad. Scholastic offers it's ebooks on their own proprietary app called “Storia” that is available for Windows, iPad, Kindle Fire, and Android. Their app includes text to speech and reading tools similar to the Kindle app, as well as learning activities to accompany the books.

---

http://techcrunch.com/2013/10/10/amazon-snaps-up-online-math-instruction-company-tenmarks-to-help-it-make-education-apps/
EDUCATIONAL APPS

According to the Kindle Apps Store, there are 13,000 education apps available. There are; however, many apps tagged in the education category that are inappropriate (e.g., “Sexy Asian Girl” and “Cannabis Oil Benefits” and “Lap Dance School”) as well as many games. Below is a selection of notable educational apps that are available on Kindle (as well as many other platforms):

• Duolingo
• BrainPop and BrainPop Jr.
• Stack the States
• Discovery Channel
• Quizlet
• SpellingCity
• Edmodo
• myHomework Student Planner
• StudyBlue Flashcards
• Scootpad
• Schoology

• Microsoft OneNote
• Socrative and Socrative Teacher
• McGraw-Hill ConnectED
• Talking Tiles
• Math Ref
• Graphing Calculator
• Geogebra
• Adobe Reader
• Sketchbook Express
• Evernote
• Skitch

Significantly, the Kindle Fire runs HTML5 apps (with animation and interaction) natively rather than having to package them and sell them via Apple, Google, or Windows. This has the potential for allowing a rapid development of educational apps for Kindle deployment, and inexpensive customized apps developed by a school or district.

Education App Store Comparison

<table>
<thead>
<tr>
<th>App Store</th>
<th>Education Apps</th>
<th>Total Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Windows Store</td>
<td>15,000</td>
<td>142,000</td>
</tr>
<tr>
<td>Google Play</td>
<td>90,000</td>
<td>1.2 million</td>
</tr>
<tr>
<td>Apple iTunes Store</td>
<td>65,000</td>
<td>1.2 million</td>
</tr>
<tr>
<td>Kindle Fire Apps</td>
<td>13,000</td>
<td>171,000</td>
</tr>
</tbody>
</table>

* Sources
  http://www.appfeds.com/catalog/stats/
  http://www.appbrain.com/stats/android-market-app-categories
**Higher Ed Content**

Kindle offers rental of eTextbooks for higher education courses. There is no catalogue available online to evaluate the extent of their library, instead users enter the textbook they are seeking and are told if it is available.

Users rent the book for the period of time it is needed (30-360 days). Amazon advertises this process as saving “up to 80% off” of the cost of purchasing the book, but users have noted there is also no book available for resale at the end of the school year. When the textbook expires, the user’s notes and annotations remain available in their Kindle cloud account, which is a strong selling point for a higher ed user.

**AMAZON PROPRIETARY CONTENT**

Amazon’s content creation and ownership strategy is unclear at this time. One 2013 industry review remarks:

“...Amazon flat out says that it will be building its own education-oriented apps for ‘multiple platforms’…. if there’s a competitor to Apple in the tablet space that could make a real play for the educational textbook market, you would be hard pressed not to finger Amazon... Amazon has struggled to get anywhere near the volume of apps into its store that Google or Apple enjoy, but that doesn’t necessarily matter for the education market. What it needs is a core curriculum that it can sell to schools and partnerships with ed-tech vendors that can help it appear more attractive to school purchasing departments.”

But searching through Amazon’s own marketing materials and other industry publications from the past 12 months turns up no mention of this specific move into the content creation/ownership goal, other than the significant purchase of TenMarks in late 2013.

**TENMARKS**

TenMarks is a web-based math program acquired by Amazon in October 2013. The TenMarks website refers to the curriculum as both supplementary as well as an end-to-end curriculum depending on the usage model (i.e., the summer program is characterized by their language as supplementary). The program includes math concepts for grades 1-12 and is aligned with the Common Core State Standards. According to the TenMarks website, more than 25,000 schools and 7,000 districts are using TenMarks. The content can be accessed on any web browser on Android, iOS, Chrome or windows device. The content is highly customizable by each teacher.
TenMarks Approach

There are four aspects of the TenMarks program: practice, instruction, assessment, and intervention.

- **Practice** - The program offers more than 30,000 multi-step, single response and reasoning type questions that are aligned to the Common Core Standards. The assignments are automatically graded, and shown in the “results” section of the program.

- **Instruction** - Each practice set, or “track” contains embedded instruction for students (hints and videos).

- **Assessment** - There are practice assessments by grade level that are modeled after SBAC and PARCC. Based off of student performance on the assessments, a “playlist” of topics is created for each student for differentiated curriculum. A teacher can also add to the student playlists based on their own insights.

- **Intervention** - Called “amplifiers,” the program will know when a student is having difficulty with a concept. The student will go through an interactive lesson that works step by step until the student understands the concept. After the amplifier is completed, the student takes a “do-over” assignment to test their comprehension of the topic after going through intervention, and compare the results to the first set of questions.

Premium vs. Free Account

The free version of TenMarks does not include the most compelling parts of the product (student differentiation, interventions and the modeled assessments). However, the free summer program includes all of the paid version features. Included as part of the premium version of TenMarks are:

- PARCC/SBAC modeled assessments
- Interventions (see above)
- Automated differentiation that is personalized for each student
- Automated assignment feature. TenMarks assigns weekly worksheets to students based off topics in their individualized playlists
- Teacher professional development

User Experience

Once a teacher has created an account, he or she is able to add students to a roster, which will generate a list of sign in information for the students. The program also generates letters to parents with the students login information, as well as information on how parents can log in and see their child progress.

The teacher can assign sets of problems called “tracks,” which are organized by standards. Teachers can follow the Common Core concepts (called “albums” in TenMarks), or they can create their own “album” of homework sets. Each homework sets contain 10 questions for students to answer. If a student needs help on a certain questions, there are hints and videos that show the student how to work the problem. Once the assignment is complete, the student will instantly see his or her score on that homework. The teacher is able to see how long the student spent on the homework assignment as well as where the problems occurred.
The program also includes bonus games for students based on how many tracks or albums they have completed. Certificates are also rewarded for students who receive higher than an 80% on their assignments.

Use Cases
Teachers can sign up for TenMarks and use the program for free, but there are many features in the premium version that are not accessible in the free accounts.

A premium account has to be purchased through a TenMarks representative. According to their website, each student account costs $20 for the year, but is negotiable based on volume. Homeschool teachers and parents cannot purchase a premium account to access all the features. There is; however, a summer program that parents can purchase for their children (discussed below).

TenMarks Summer Program
The TenMarks summer program is meant for parents to use with their children during the summer to help students with key concepts to prepare them for the next school year. The program is advertised as free for summer 2014, with a value of $39.95 per student. Parents select the grade that their child is going into in the fall, and topics are chosen based on what will help enrich their learning in the coming school year. For example, a student about to enter 7th grade would be working on topics from 6th grade and possibly some 5th grade topics if the content will help understanding for what is to come in 7th grade. Parents are able to set up a rewards system for their children based on what they complete and students can work at their own pace to complete topics. The summer program does include the amplifiers (intervention) and the assessments that are included in the premium version of the program, according to a TenMarks representative. The website did not explicitly mention the assessments as part of the program. http://summermath.tenmarks.com/

Customer/User Support
TenMarks Premium comes with some professional development, but it is fairly limited. There is no hands-on or in-person support offered; but there is a Help Desk site that contains many training videos and guides. Additionally, there is a button to report any issues if you need to contact a representative. When contacting them about a premium account, a representative responded within a few hours.

TenMarks also has webinars for training. There are webinars for anyone to view and some exclusively for premium members. Their website advertises “Webinar Wednesdays” twice a month; however, the last two webinars were in May 2013. There are three archived webinars as well, including topics on how to make the most of TenMarks, and a two-part introduction to Common Core.
Amazon Web Services

Amazon Web Services ("AWS") has been one of the fastest growing and most popular segments of Amazon's business. AWS offers a number of cloud services including hosting and storage along with services that are not exposed to users in order to allow organizations to virtualize the infrastructure and some of the IT support. AWS began in 2006 and it has been estimated that AWS accounts for $1.5 billion in revenue for Amazon.

AWS has been widely adopted in high-education, but much less so in K-12. Perhaps the greatest opportunity for collaboration between Intel and Amazon is in the K-12 cloud services space. Not only does AWS use Intel Cloud Technology in their servers, but Amazon would greatly benefit from Intel Education’s expertise in understanding the K-12 market.

Amazon Web Services holds many different events, ranging from webinars, to roadshows to large conferences. Most events are focused on cloud computing and technical content relating to AWS offerings.

The AWS Government, Education and Nonprofits Symposium, held in Washington DC on June 26-28, 2014 is the only event with focus in education; although, it is very technically focused. This event is a two and a half day event giving leaders and technical professionals an introduction to the AWS cloud, guidance on architecture and engineering, opportunities to share and exchange ideas, and look to build business relationships.

The other large event is the AWS re:Invent, held in Las Vegas in November. This event is the largest event that Amazon holds and will help attendees refine their cloud strategy, improve developer productivity, increase application performance and security, and reduce infrastructure costs. More information is available at http://aws.amazon.com/about-aws/events/.

11 http://en.wikipedia.org/wiki/Amazon_Web_Services
Kindle Devices in Educational Settings

SCHOOLS USING KINDLES

There are many schools using Kindles in small numbers; however, there are very limited numbers of schools using a large quantity of Kindles. Many schools also allow Kindles to be used as part of their BYOD program.

When Amazon opens up a new warehouse or distribution center, they typically donate a number of Kindle devices to a school in the area and include gift cards to the Amazon store for use towards educational content.

Case Studies

An online search revealed only a small number of schools with large-scale Kindle use. Please see the Reference section below for links to more detail on each of these cases.

Clearwater High School – Pinellas County, Florida

This is the largest deployment of Kindle devices, and is the model used for Amazon's advertising of Kindles in education. Clearwater has implemented a one-to-one deployment of about 3,628 devices. The school uses Whispercast to distribute the content. The principal reports an increase in test scores and grades since the beginning of the program.

Curtis Fundamental Elementary – Pinellas County, Florida

Curtis Fundamental is another school that is profiled by Amazon; however their deployment is much smaller, at about 73 Kindles (at the time Amazon wrote a whitepaper on them – there is no date on the document). They are also using Whispercast to distribute reading enrichment content for grades 3-5. The school intends to purchase another set of devices, which would be funded by PTA.

Canton McKinley High School – Canton, Ohio

During 2011-2012, Canton McKinley launched a pilot program with 75 Kindles. In an article featured in ASCD (noted in References section below) the advantages and disadvantages of Kindle use were noted. The students and teachers liked the built-in tools of the Kindle devices, including the highlighting, annotations, text to speech function as well as the built-in dictionary. They also liked having differentiated texts and the idea of “going green.” Some of the disadvantages the school noted were issues of the particular school, not the devices (such as the server capacity of the school and logistics and training).

Additionally, the teachers found that the students were uncomfortable using the devices for high-level work. This pilot study was before Whispercast was launched, so one of their obvious complaints was the inability to deliver the same content on each device easily. Lastly, the school found that they still needed to purchase...

http://www.amazon.com/gp/aw/help/id=201014950/ref=hp_200699130_storeTOU1
texts, and it was a time consuming process to find interesting, engaging resources.

**Milton High School – Fulton Country, Georgia**

Milton High uses Kindles with special needs children, especially those who have ADD and need help focusing. They like the Kindles because of their ability to turn off social media, or web access altogether.

**Central Union High School – El Centro, California**

This school is expecting to buy 900 Kindle Paperwhites that would be deployed in the fall of 2014. They plan to use the Kindles to participate in the Expository Reading and Writing Course, which is part of the senior English program. The curriculum is already based online, so the deployment would allow students to access content without printing it.

**Amazon Donated Devices**

**Anderson School – San Bernardino, California**

In January 2013, Amazon donated 90 Kindle devices and $2,500 in gift cards to Anderson School for special needs students. Amazon opened a distribution center in San Bernardino, California.

**Justice Elementary School – Winchester, Kentucky**

When Amazon opened up a customer service center in Winchester, they donated 90 Kindles and $5,000 in gift cards to the elementary school.

**Community Elementary School – Coffeeville, Kansas**

In January 2013, 50 Kindles and $2,500 in gift cards were donated to the elementary school when Amazon opened a fulfillment center in Coffeeville.

**Northstar Academy – Richmond, Virginia**

In December 2012, Amazon opened two distribution centers in Richmond, Virginia and donated 80 Kindles and $2,500 in gift cards to the Northstar Academy.

**South Carolina School for the Deaf – Spartanburg, South Carolina**

Amazon opened a fulfillment center in Spartanburg, South Carolina and then donated 40 Kindles and $2,500 in gift cards to the South Carolina School for the Deaf.

**The Hutson School**

In May 2012, Amazon donated 75 Kindles and $2,000 in gift cards to the Hutson School, which specializes in education for children with dyslexia and other learning challenges.

INFORMAL EDUCATION APPLICATIONS

Kindle FreeTime

This set of controls comes installed on new Kindles. It automatically blocks access to the Silk Browser and Kindle content stores, disables location-based services, in-app purchases, or social features (such as GameCircle, Facebook, and Twitter), and requires a parental controls password to access Kindle FreeTime settings, exit Kindle FreeTime, or enable or disable wireless connectivity.

Each Kindle can be set up with 4 different “profiles” (different children) with individual assigned content and access settings. There is an optional monthly subscription service for content, and parents can also assign any content they already own to each profile.

Profile set up includes:

- Weekdays / Weekends - Choose different educational goals and time limits for the weekend or weekday.
- Bedtime - Set a time limit for when the user can use the Kindle during the day. Includes an option for: Stay off until to set the time when Kindle FreeTime can be used again.
- Education Goals - Set goals for viewing educational books, apps, movies, and TV shows. Users can filter non-educational content from being used until the child’s goals are met.
- Total Screen Time - Limit the total time your child can spend in Kindle FreeTime.
- Content Activity Time - Specify individual time limits for reading books, watching movies or TV shows, or using apps or games.
Legal Considerations

As Amazon has been moving Kindle into educational settings there are a number of questions that have not been resolved for these applications.

CONTENT OWNERSHIP AND SHARING

There is a disconnect between how Kindle content access works inside and outside of Whispercast. On a non-Whispercast account, any purchased content can be shared with 6 devices and Amazon clearly states they expect this to be more than one user, not just more than one device. This has been the Kindle sales pitch since the beginning: your whole family can share the content and you can access your content through your own multiple devices.

However on Whispercast, each content asset has to be purchased for each individual device and cannot be transferred later to another user. So it is 6 times more expensive for schools to go the Whispercast route. School libraries are not interested due to this cost issue (per discussions in American Libraries Magazine, EdTech Magazine and others).

An additional issue around Kindles in education is not Whispercast related: while some schools have adopted Kindles to replace library books, there is quite a bit of discussion online about the legality of this use. Even though schools have reportedly asked it be changed, the Kindle policy as of 4/18/2014 still states:

Limitations. Unless specifically indicated otherwise, you may not sell, rent, lease, distribute, broadcast, sublicense, or otherwise assign any rights to the Kindle Content or any portion of it to any third party...11

This language gives many librarians pause, as they feel that at any time Amazon can access their accounts and strip the Amazon-purchased content based on this policy.

CHILDREN’S ONLINE PRIVACY PROTECTION (COPPA)

The Fire HDX has the newly launched and highly touted “Mayday” button for customer support. There is no way to disable this function other than:

• Using Whispercast policy controls to block all internet access; or

• Having the school’s IT department block that URL
A student using the Mayday button is “invisible” to the Amazon employee, but the content on their screen is visible, and according to Amazon’s site:

“When you connect, an Amazon Tech advisor will access your device. The session may be recorded for quality assurance.”

This has the potential to lead to COPPA violations if the student has photos or other identifying information on their screen when connecting to the Mayday helpline.

**ADA COMPLIANCE**

In 2009 Amazon launched higher ed programs for Kindles in education at several institutions across the US. This precipitated protests from student groups and disability advocates because the Kindle provided no accessibility features.

Cited issues included:

- The propriety text to speech engine meant that the Kindle content and app could not interface with otherwise accessible devices

- Kindles did not provide similar experience to students with and without disabilities, such as looking up words in the dictionary, annotating, or highlighting passages, etc.

- Kindle books could not be displayed on Braille devices

The studies were discontinued and Kindle began making steps towards full accessibility. In 2013 Amazon announced new accessibility features had been added into Kindle, but industry reports noted,

“The new release has been hailed as a step forward, but it has also been criticized for lacking major accessibility elements.”

The still problematic accessibility issues inherent in the Kindle and Kindle apps is likely a large stumbling block that will need to be addressed before Amazon will see wide or deep adoption in schools.
References

FEATURES AND TECHNICAL INFORMATION
http://best-kindle-comparison-review.toptenreviews.com/
http://www.amazon.com/dp/B00CU0NSCU/ref=fs_jw
http://www.amazon.com/dp/B007HCCNjU/ref=sa_menu_kdptq
http://www.digitaltrends.com/mobile/kindle-fire-hd-problems/#IFUf7L
http://www.digitaltrends.com/mobile/amazon-addresses-kindle-paperwhite-problems/#!GOjaq
http://www.amazon.com/forum/kindle/ref=cm_cd_rvt_np?_encoding=UTF8&cdForum=Fx1D7S3BVSESG&cdPage=2&cdThread=Tx2lM0NIQHVP609#CustomerDiscussionsNew
http://www.interactiveaccessibility.com/news/accessibility-fire%E2%80%A6-kindle-fire
http://9to5google.com/2013/12/09/amazon-boosts-kindle-fire-with-new-education-features-for-kindle-freetime/
http://lifehacker.com/ios-vs-android-which-platform-has-better-tablet-suppo-1560660066

CONTENT
http://www.tenmarks.com/
http://summermath.tenmarks.com/
https://www.edsurge.com/tenmarks
http://summermath.tenmarks.com/TenMarks-56W-73QU.html
http://info.tenmarks.com/WebinarArchive.html
http://www.pearsonschool.com/index.cfm?locator=PS1sQj&acornRdt=1&DCSext.w_psvaniturl=http%3A%2F%2Fwww%2Epearsonschool%2Ecom%2Fmobileandetext
http://store.scholastic.com/
https://www.mheonline.com/digital_solutions/
http://www.rudebaguette.com/2013/08/15/can-amazon-ignite-html5-apps/
CASE STUDIES: SCHOOLS USING KINDLES
https://whispercast.amazon.com/info/school-clearwater-highschool/ref=kas_clearwater_cap
https://whispercast.amazon.com/info/school-curtis-fundamental-elementary/ref=kas_curtis_cap
http://www.edtechmagazine.com/k12/article/2014/01/what-does-whispercast-mean-schools
http://www.glendalenewspress.com/sports/wxin-amazon-donates-75-kindles-to-the-hutson-school-20120530,0,1074745.column

EDUCATION PROS AND CONS
http://www.speirs.org/blog/2012/11/25/thoughts-on-amazon-whispercast.html
http://ilmk.wordpress.com/2013/08/02/whispercast-50-service-charge-for-each-book/
http://www.edukindle.ning.com/profiles/blogs/no-to-whispercast
http://www.americanlibrariesmagazine.org/blog/amazon-whispercastbut-it-libraries