TLLP: Teacher Learning and Leadership Program for Experienced Teacher

Developing Critical Thinking and Collaboration in the 21st Century Mathematics Classroom

2013-2014

Learning Tool Rationale Document

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2013

Catholic School Learning Plan and System Direction

Cardinal Ambrozic's technological vision serves to directly support the Dufferin-Peel Catholic School Learning Plan by means of direct system support of the Learning Environment pillar (overall system goal) and related initiatives. It does so in the following ways:

- ✓ The development of a strategic technology plan outline in the Rationale Web
- ✓ Initiatives regarding the use of personal technology such as the use of Wi-Fi, tablets, laptops and other digital technology in support of elements of the Rationale Web
- ✓ Development of e-Learning initiatives such as Blended Learning in the classroom by the use of the OERB to support student learning as shown by the Rationale Web
- ✓ Use of digital technology to support professional development by means of web broadcasting (i.e. SMART Sync software, video lesson, etc.) to achieve the overall system goal

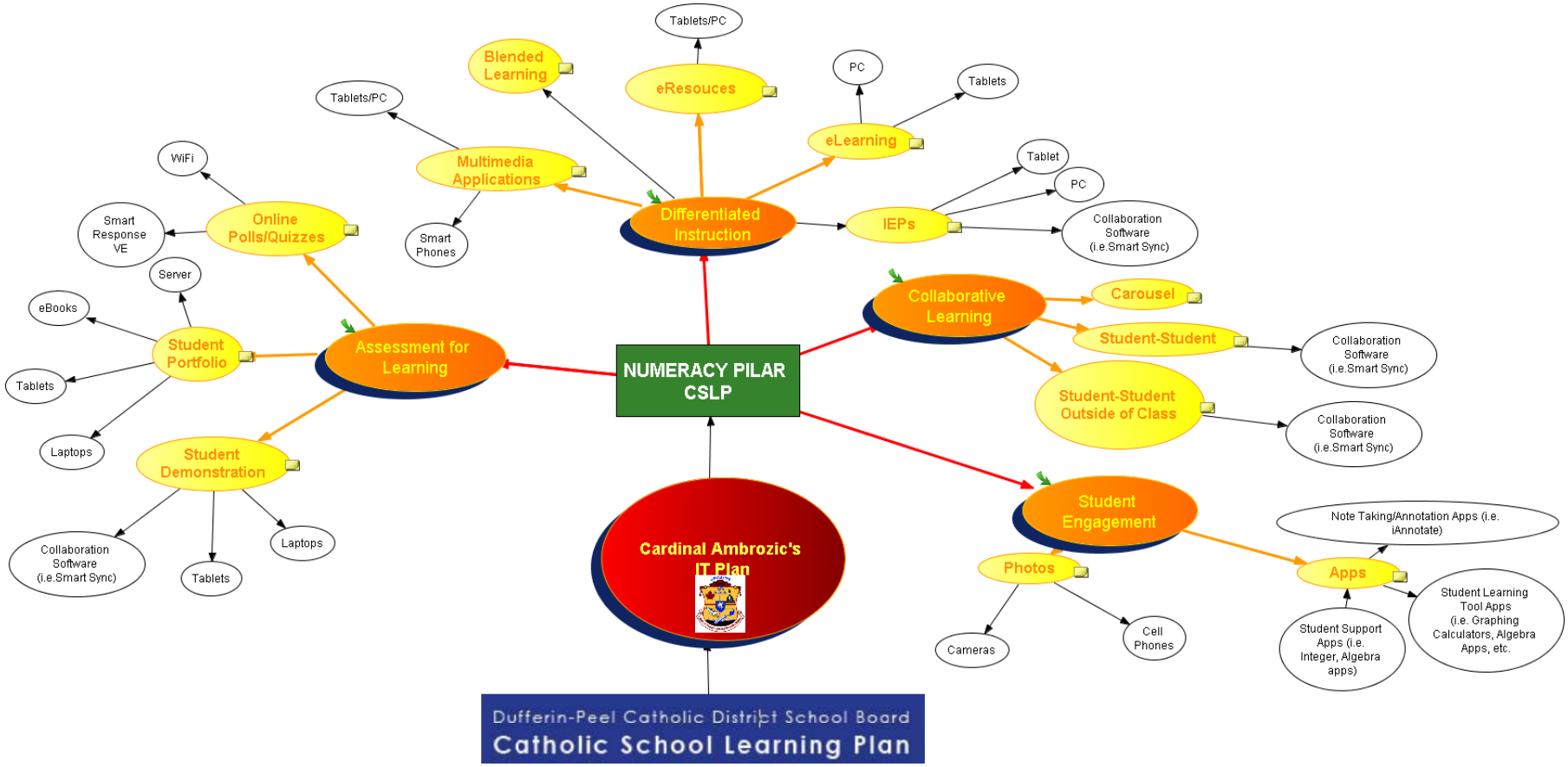
Teacher Learning and Leadership Program Overview

TLLP Ministry Project: Developing Critical Thinking and Collaboration in the 21st Century Mathematics Classroom

Research tells us that collaboration is an essential tool to develop student understanding and critical thinking. This project will allow our group to explore the two "C's" of 21st Century Learning: collaboration and critical thinking. Our Professional Learning Team will aspire to create a professional learning cycle (PLC) to lead both faculty and students alike into the 21st Century Classroom, fostering critical thinking through a collaborative learning model (Catholic Graduate Expectations 5a and 5b).

Given the diverse learning needs of students within the classroom, and the changing nature of the workplace, the use of various technologies would complement and help to foster critical thinking through collaboration. We plan to implement learning through collaboration using: Web 2.0 tools such as - wikis, blogs, LMS (Ministry Funded), discussion boards, Social Media (i.e. Twitter, You Tube, etc.), Online Presentation Tools (i.e. Prezi, Desmos, Bitstrips and Thoughstream), eLearning Ontario and Collaboration Applications (i.e. Adobe Connect, Share Board, SMART Sync., SMART Bridgit, etc.)

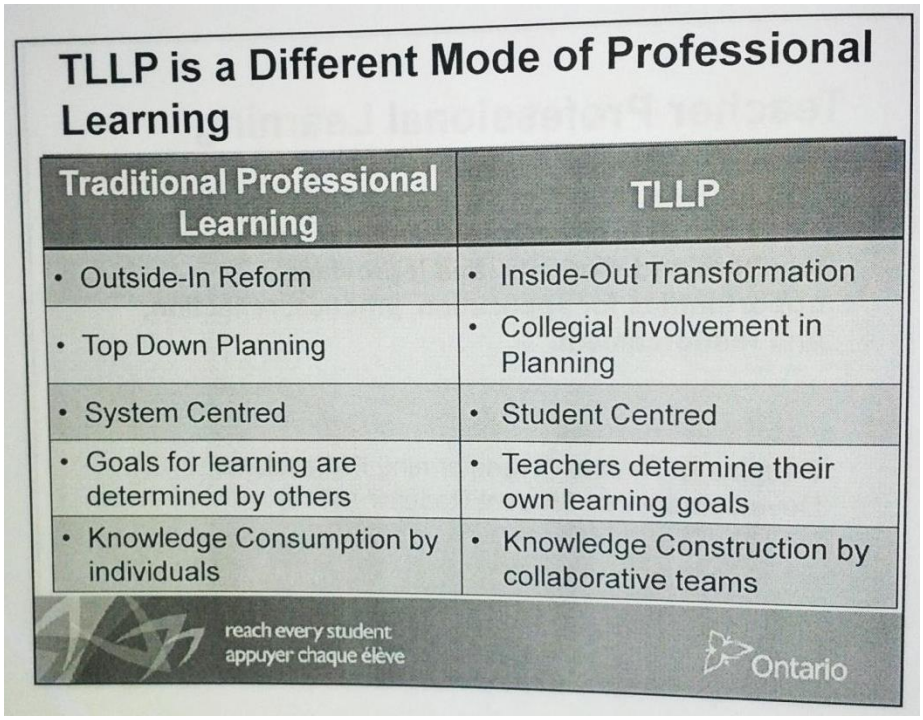
TLLP Rationale Web



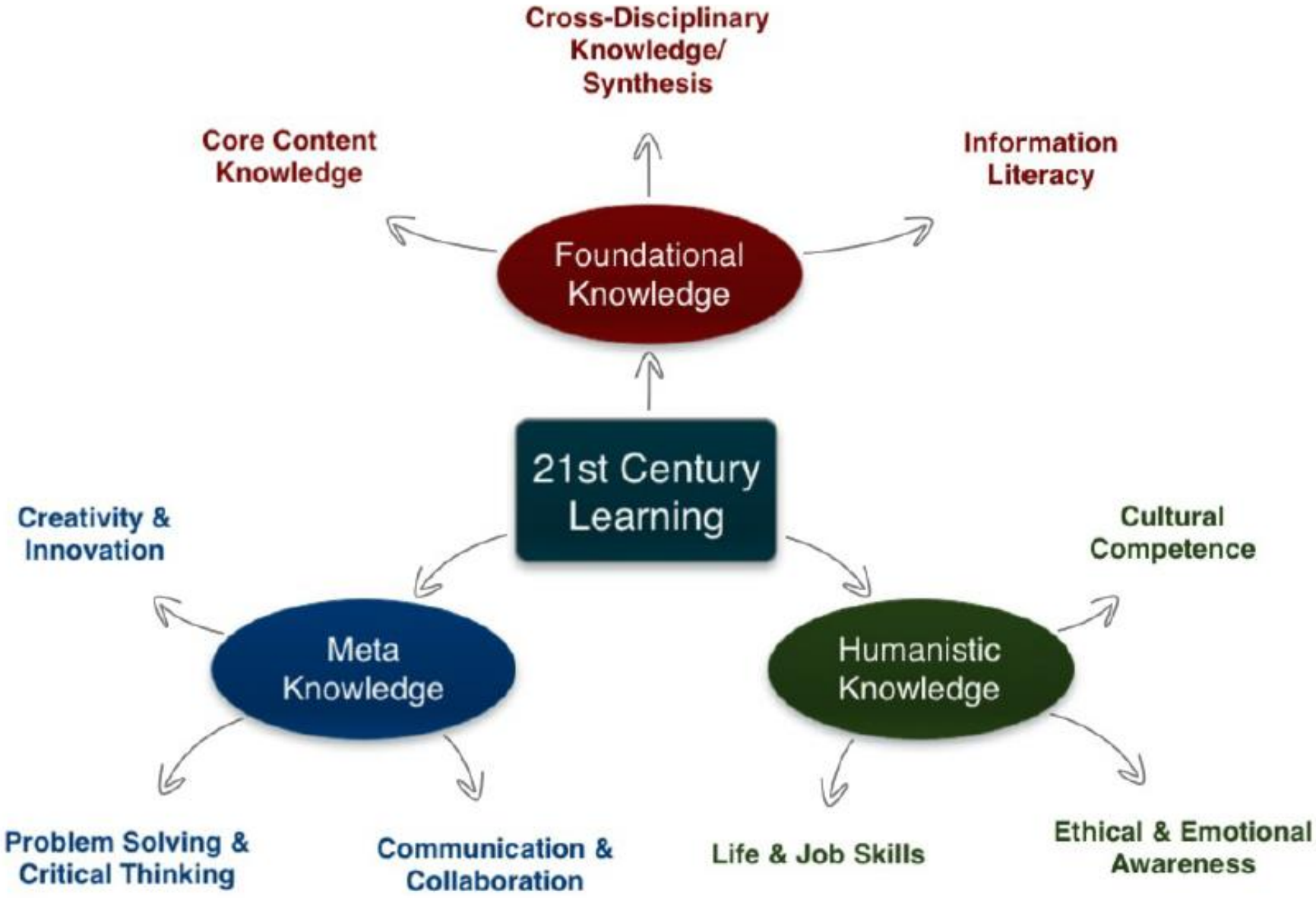
Teacher Learning and Leadership Program Technology Rationale

Purpose of TLLP

A TLLP is a program that allows experienced teachers to learn and expand their teaching horizons by exploring new pedagogies. It allows us to explore and learn new practices which are not commonly used in the regular classroom. The TLLP is **teacher led, self-directed learning that empowers educators** to "*undertake innovative, self chosen professional learning activities in areas that are meaningful to them*." TLLP Fundamentals Training Session 2013.



We explored what technologies are growing the fastest in the community and found that students are required to understand and use the current technologies that are available for collaboration and critical thinking.



P. Mishra and K. Kereluik. "What is 21st Century Learning? A review and synthesis." Paper submitted to the SITE2011 Conference. (2011)

P. Mishra and K. Kereluik. "What is 21st Century Learning? A review and synthesis." SITE2011 Conference Presentation. (2011)

Learning Tool Rationale: Why iPad?

iPad Classroom Integration Via SAMR Model

The tool we chose to ensure a high level of collaboration and critical thinking was the iPad mini. Dr. Ruben R. Puentedura[1], states, if technology is considered a worthy learning tool it must follow the SAMR Model (Substitution, Augmentation, Modification and Redefinition)

1. Substitution

For technology to be a suitable learning tool, it must act as a direct tool substitute, with no functional change. The iPad can substitute several mathematic tools in the classroom. It can replace the following classroom tools:

- TI-Nspire Graphing Calculator
- Algebra Tiles – Unlike a laptop, students can touch and manipulate the tiles on screen
- Geoboards – Again, students can change the geoboard as they would a real one
- SMART Board – the iPad instantly becomes a portable SMART Board with the same functionality
- eClicker – removes the need of the SRS units and has improved performance
- Geometer's Sketchpad

2. Augmentation

Augmentation states that technology acts as a direct tool substitute, with functional improvement. With the iPad, students are able to **collaborate** in real-time. This tool allows students to communicate while at the same time recording and storing an individual portfolio. Tools like *SMART Bridgit*, *Blackboard* allow students to interact with several virtual items all at the same time. Note taking tools such as *sling Note* and *Evernote* allow students to take notes as they have never done before. They can insert images, videos and audio in any section of their note. They can rearrange pages and edit the notes at any time. These notes can then be exported to several file formats.

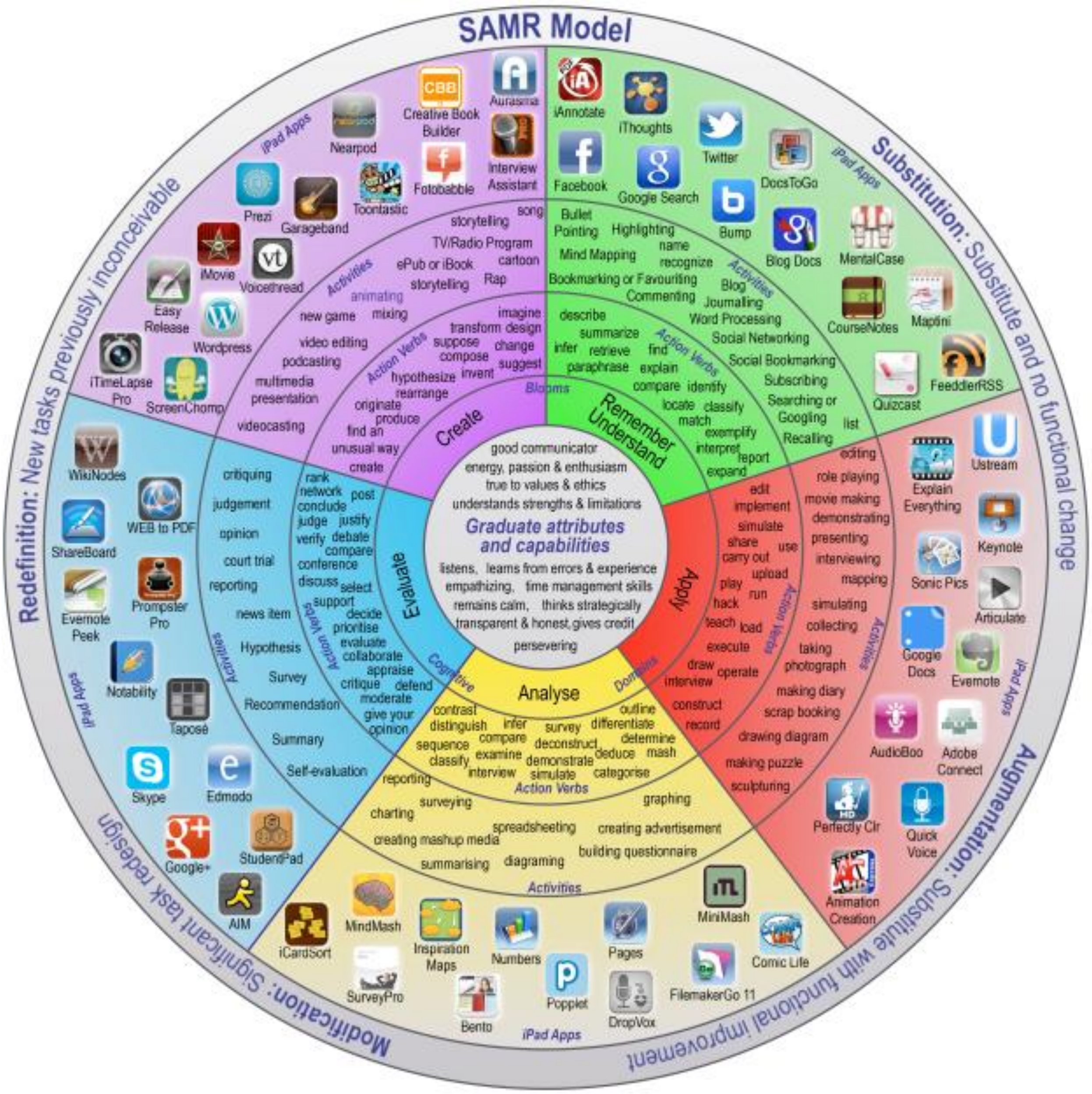
3. Modification

Technology must allow for significant task redesign. **Critical Thinking** allows for students to make the most well-informed decision based on the given information. Using mind mapping apps such as *iThoughtsHD, Popplet* and *Inspiration* allows students to brainstorm and plan out their thoughts. These tools can export their maps to several different types of media. *Shareboard* is a collaboration app that allows 32 people to collaborate on different files.

[1] Dr. Puentedura's is the Founder and President of Hippasus, an educational consulting firm focusing on transformative applications of information technologies to education. The basis for Hippasus is to be found in Dr. Puentedura's eighteen years of work in educational research and reform

4. Redefinition

Technology allows for the creation of new tasks, previously inconceivable. Apps such as *iMovie* allow students to get creative while using images, video and audio. This is truly mobile allowing students to capture video and audio in real-time. Redefinition of communicating in the classroom can also be seen the *Voice Threads* app. This enables students to **communicate** on any given task in real time using video, audio and images. Students can then collaborate making comments and statements on student posted voice thread media.



http://www.educatorstechnology.com

Learning Tool Considerations – Tablet Devices

This is the direction of many educational institutes who have already studied the value in tablets.
-cost effective
-tablet cameras are excellent
-portable
-no wiring in the classroom
-inexpensive and free educational apps
-Apps engage student learning
-Can replace all other technologies in the math classroom

Choice of Learning Tool: Why iPads?

1. Number of Educational Apps

A. Why Native Apps and Not Mobile Apps

Today many programs are now available through web browsers using HTML 5 programing conventions which are working through multi-platforms. Although these mobile apps are functional, they are created more for productivity as opposed to creative exploration. Native apps for education are robust and designed as engagement tools which focus on the learning environment.

Business Productivity	Learning environment
Monetary or Revenue Driven	Knowledge Creation and Dissemination
Cost Reduction (Productivity)	Creative Exploration
Highly Restrictive	Highly Collaborative, Interactive and Ad–Hoc
Software Solutions are Functional	Software Solutions are Expressive
Network Centric	User/Student Centric
Total Cost of Ownership	Total Opportunity of Ownership

Design

Productivity vs Learning

The main difference between native and web-based apps is that native apps do not require Internet connectivity, whereas mobile web apps do. Native apps may or may not have a cost associated to them, but they typically offer a better user experience due to the fact that they allow for more personalization and customization. The only downside is that they cannot be used on all devices. An app that is native to iOS can be used only on

iPhones, iPads, and iPods, just as an app native to Android can be used only on Android devices.

Mobile web-based apps, on the other hand, cannot match the interactivity of native apps and require constant Wi-Fi access in order to be usable. But they do have the advantage that they can be used by anyone using a web-enabled device, regardless of brand or operating system.[2]

B. *Why iPad Apps?*

We explored iPads, Android Tablets, and Blackberry Playbooks. Although the hardware of each tablets are comparable to iPads, what sets iPads ahead of the other devices is the vast repertoire of educational Apps, more apps that are reliable and cost.

- Apps at the Apple Store have gone through a quality control and approvals process whereas Andrioid Apps can be upload by anyone (no quality check)
- As an educational institution we qualify for Apple Volume Purchasing (AVP) – this streamlines the purchasing and distribution of Apps to multiple devices and generates "redeem codes" so the Apps can be securely downloaded to each device. Apps are often available for a significant discount via AVP (e.g. through AVP QuickOffice costs $9.99 whereas purchasing it individually costs $14.99 in the App Store and on Android) – here's the AVP link for Canadian Education - http://www.apple.com/ca/education/volume-purchase-program.

C. *Exclusive iPad Educational Apps*

In fact, many of the educational apps that are part of the math curriculum can only be found on the iPad:

Some iPad Exclusive Apps

1. ***Geometer's Sketchpad***-Sketchpad has been used for years in mathematics. The app version allows students to interact with Sketchpad files. The familiarity of sketchpad makes the transition to tablets easy
2. ***TI Nspire App –*** These calculators are currently used in the math classroom. The app is a fraction of the cost of the actual hardware (not to mention the cost of battery replacement).
3. ***eClicker*** – an app that works as the SMART Response Student Assessment System. It allows you to upload images where other online services do not

[2] Passage was taken from http://guidebook.com/

iPad Exclusive Apps – SMART Board Apps

Our school board has invested a great deal of finances to have schools purchase SMART Boards. Cardinal Ambrozic currently has SMART Boards installed in every classroom. The iPad is the only tablet that allows one to install SMART Notebook on a mobile device. This makes sharing and interacting of classroom activities that would normally be done on Smart Board seamless.

1. ***SMART Notebook***-Our schools are familiar with this technology and software
2. ***SMART Bridgit***-A SMART App that allows iPads to directly collaborate in real-time on any teacher SMART Notebook file

In addition to the apps listed above, there are also thousands of apps that support many of the expectations in our curriculum. Also, much of the research on tablets in the classroom is centered around the iPad (i.e. OAME 2013)

2. Student Familiarity

Apple products are the technologies that many of our teenage students use and are familiar with. In a recent survey at Cardinal Ambrozic C.S.S.:

- 71% own a mobile device
- 72% who own a mobile device own an apple product

A student who recently moved from an Android to Apple product stated: "The iPad is easy to use, reliable and fast. The apps are more reliable and user friendly"

NEWS:About 1 in 3 Canadians now own a tablet: poll

TORONTO - Tablet ownership continues to grow in Canada with a new poll suggesting that about one in three Canadians has now purchased one of the gadgets.

According to telephone surveys conducted with 4,021 Canadians between March and April, 31 per cent of those polled said they owned a tablet, up from 26 per cent in the fall, says a report by the Media Technology Monitor.

About two-thirds of all the tablets owned in Canada are iPads, with BlackBerry Playbooks representing 13 per cent of the market and Samsung Galaxys taking up nine per cent.[3]

[3] Citation taken from the Canada Press June 21st, 2013

3. Cost

A. Comparing Tablets

Compared to other tablets, the iPad mini delivers better functionality than the iPad 2 and costs almost $200 cheaper than the iPad 4 – Retina

Tablet	Cost	Pros/Cons
iPad Mini (Our Choice) iPad 2 iPad 4 Retina	$309 $399 $499 **Set of 30 = $9,270**	+Size +Resolution +Reliability +Number Of Educational Apps +Best Tablet Rating http://reviews.cnet.com/best-tablets/ -No USB -Memory 16GB
Samsung Galaxy 10.1	$449 **Set of 30 = $13,470**	+USB +Memory 32GB -Battery -Not User Friendly -Reliability of Apps -Price
Windows Surface RT	$499 **Set of 30 = $14,970**	+USB +Memory 32 GB +Screen Size -Number of Apps -Price -Best **productivity** Tablet (http://reviews.cnet.com/best-tablets/) Our use is NOT productivity but creativity, collaboration, and engagement

B. Other Cost Saving Items

The iPad offers several cost saving benefits:

Item	Description	Cost Savings
TI-Nspire App	The iPad can act as a TI-Nspire for $15 an app. This makes the iPads a class set of TI Nspires.	TI-Nspire Cost: $135 Class Set Savings: $120x30 (plus batteries)=$4000
SMART Response Units	The iPad can eliminate the cost of using a set of clickers in the classroom	SRS Class Set = $3000 eClicker App =$14.99 Cost Savings (plus batteries)= $3100
Textbooks	With iTunes U and eLearning the entire math program can be placed online for students to use Paper savings 6 sheets/day x 194 days x 180 students	Textbooks = $80 x 30 Photocopies = $2000 Cost Savings = $6,400
	***ONGOING EXPENSES**: Batteries and Photocopies)*	*$2000/yr*
	Total Cost Savings iPads, Laptop, Protectors, Apps	$13,500 + $2000/yr (ongoing) $12,000

4. Student Collaboration and Presentation

Sharing of Student Work

The iPad allows students to share their work directly to the classroom with ease using one of several cost effective items:

-Apple TV ($99)
-AirServer ($15)

5. Collaborative Inquiry

Apple's iPad offer more support than any other tablet. Educational institutions have been using these devices for the past few years. Research has established the iPad to be an effective learning and teaching tool province wide.[4] The available professional development, support and collaboration on how to effectively use this tool in an educational setting, is growing exponentially. This has been clearly demonstrated in educational settings such as OAME and OBEA conferences where iPad have become main stream. Based on the iPad's pedagogical track record, our TLLP can remain focused on Collaboration and Critical Thinking.

[4] Kyle Pearce *Tap Into Teens Minds*: http://tapintoteenminds.com/