Case Study of an e-Learning Ecology

Publisher: EPSY 590ML (2014) Learning with Mobile Technologies
Start: Jul 1, 2014
Due: Jul 20, 2014

Project Overview

Produced with Scholar

Google Apps for Education

Version 3

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Jul 23, 2014 at 7:55 PM

Image from http://www.point-star.com/products/cloud-email-systems/google-apps-for-education/

Background

In 2007, Google released Google Apps for Education (GAFE). This suite of applications includes Gmail, Drive, Calendar, Docs, Sheets, Slides and Sites. A school district is able to create accounts for its students and staff which enables them to use any of these apps on nearly any device. It is available to K-12 districts, colleges and universities at no cost and

includes 30GB of storage space per account without ads. Google Apps for Education was created to help address several issues in educational technology.

One issue students have faced is the difficulty in collaborating with others on projects. Students often had to be in the same room, or even on the same device, to collaborate. This caused students to balance completing their work along with busy schedules. Google Apps for Education enables students to work on the same document from different devices at the same time ("Google for education"). Students can share their documents with other students and type in additions and comments in real-time.

Many students often desired to continue working on assignments outside of school but did not have compatible technologies. A student's school might use Apple Pages for word processing and the student only had Microsoft Word available at home. Converting between these types of documents is not easy either. Google Apps works on multiple devices since it is web-based. As long as the computer is connected to the internet, Google Apps can be accessed. Google works with Mac, PC, Android, Windows Phone, iPhone and Blackberry making it easy for anyone to access their documents ("Benefits-Apps").

Teachers often struggle to find ways to make learning more interactive and engaging for students. GAFE helps by offering students the power to manipulate and customize their projects as well as share them with others. Students are more engaged in their learning when they have the ability to create something in their own way, share it online and receive positive feedback from their peers.

Schools must also keep staff and student data secure as well as keep students safe while using technology. Google offers many ways to configure security settings for student accounts. Administrators can disable certain application, like Gmail, and monitor the revision logs of any student created document.

One other important issue Google addressed is the cost for educational technology. Currently Microsoft Office Home & Student 2013 (includes Word, Excel, PowerPoint, OneNote) costs $139.99 ("Buy office 365"). Apple's Keynote, Pages and Numbers each cost $19.99 ("Apple-Creativity").

When schools attempt to move toward one device per student, a school of 1000 would pay nearly $140,000 for Microsoft Office. They would also continue to make payments for new versions in future years. Google Apps for Education is free for schools and does not charge for their updates.

Application in the Classroom

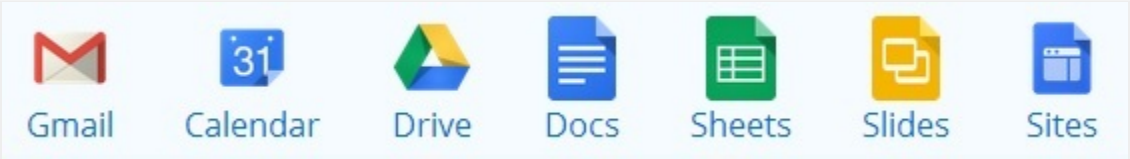


Image from http://www.google.com/enterprise/apps/education/products.html

Each of GAFE's applications offers unique features that support learning in the classroom.

Gmail is GAFE's email service. It offers 30GB of storage and filters 99.9% of spam. Since there is such a large amount of storage space, teachers and students do not need to delete messages; they can archive them with labels to be easily found again later. Gmail is beneficial for teachers as they can send messages to other staff members, students and parents. Students can also email their teachers or other students questions about assignments. Users can also share large attachments (up to 10GB) with Gmail that many other email services can't ("Features-Find"). This makes it easy for teachers to share photos home to parents without having to send several emails.

Calendar helps staff and students stay organized. Users can easily add events to their calendar by clicking on the time and entering as much information as they would like. These calendars can also be shared with others. When teachers are trying to find time to meet with other teachers, they can overlay all of their calendars in order to find common availability.

Club and sport calendars can also easily be shared with students and parents. Events created in Calendar can be sent as invitations to others complete with an RSVP manager.

Drive is Google's cloud storage system. It allows users to upload any file type to be saved and accessed anywhere with internet. It also houses some of GAFE's other applications: Docs, Sheets, and Slides. When a user creates a Doc, Sheet or Slide, it is automatically saved in Google Drive. Any file in Drive (even a single photo) can be shared with other Google users.

GAFE users can create three different types of documents: Docs, Sheets & Slides. When a document is shared with another individual, the document owner can choose to enable the other user to view only or to view and edit. This is helpful for when a teacher may want to share something to a student or parent without them being able to edit it (view only) or if a student would like to collaborate on an essay with another student (view and edit). Docs is a word processing app that enables users to embed text, images, links, drawings and more. Sheets is a spreadsheet app that lets users input data and analyze it with formulas, charts and filters. Slides is a slideshow presentation app that enables users to share text, embed images and video with animated slide transitions. Each of these documents also contains a commenting feature. Teachers and other students can add comments to sections of a project that can be reviewed-great for peer editing and teacher feedback.

Sites lets GAFE users build and manage their own websites. Students can create a website for their portfolio or to present research information. Teachers can also create a Site to house links to material, important dates and homework reminders. Sites includes templates to choose from and does not require knowledge of coding. Students and staff can also collaborate on the same site and choose who can view their site.

Analysis

Google Apps for Education supplements Collaborative/Reflexive Learning. It can best be analyzed by the seven e-learning affordances framework developed by Dr. Bill Cope and Dr. Mary Kalantzis at the University of Illinois Urbana-Champaign. Cope and Kalantzis found there to be seven significant affordances of education technologies (image below).

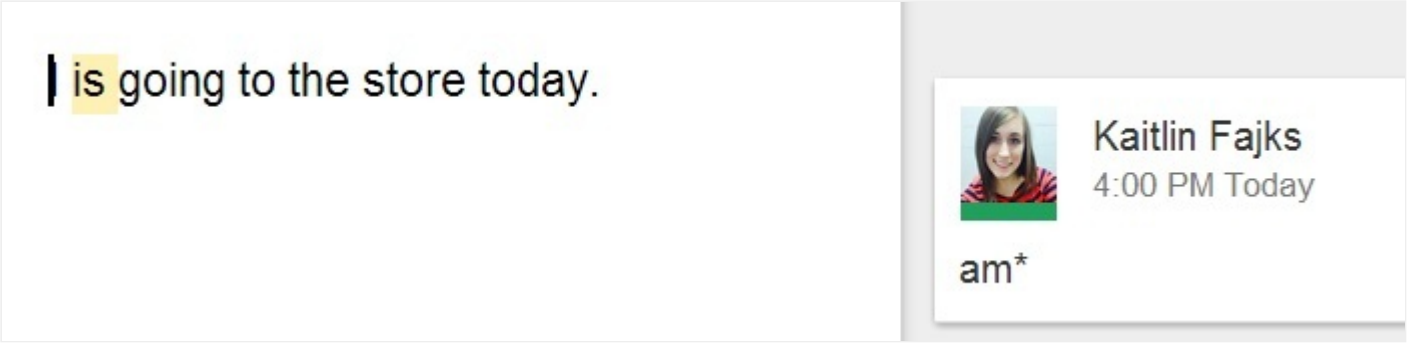
7 Affordances developed by Dr. Bill Cope & Dr. Mary Kalantzis

With the use of Google Apps for Education in the classroom, ubiquitous learning can occur. Since GAFE is available at any time of day, and from any device with internet, students and teachers can access documents in and out of the classroom walls. Students can start a research project and continue to easily work on the same document from home. Teachers can also access student documents from home to answer questions and post feedback using the comments feature to guide student learning. They can even view the Revision History of the document and see when a student has added content. With GAFE being so widely available, learning does not only take place inside the classroom.

GAFE also enables students to become knowledge producers as opposed to knowledge consumers. Many different applications are available to students through Google. They have the ability to choose the best medium for demonstrating their learning. They can use Docs to create an essay, Slides to embed photo and video examples, Sheets to manipulate data in their findings and Sites to share out a large collection of research. These apps also work together and can be embedded within each other. Students may then use the Sheets app to create a graph from data collected and display it on their Site or Doc. With so many possibilities, GAFE enables students to design the meaning of their research in a way that makes sense to them.

Since not all students learn the same way, it is important to have the ability to embed various forms of media into the artifacts they produce. Google Apps for Education offers students many options for embedding media. Students can add hyperlinks to text in their documents, insert and manipulate pictures, insert videos into Slide presentations, and add existing tables from the Sheets app or create their own in a Doc with tables. GAFE also includes the "Insert Drawing" feature in its apps. Students can choose this option and create their own original image to embed. These options are important for students since they need to learn how to present information in a clear manner. They must explore the benefits of including hyperlinks and images into their original artifacts.

Any app in Google Apps for Education offers ways for students to receive recursive feedback. In Docs, words and phrases can be highlighted and comments can be typed next to them. In Slides, comments can be added to each slide. In Sheets, comments can be made in a single data box or an entire row or column. Teachers and peers can note specific areas that need attention before the final draft. Google's Sites also enables constructive feedback through the use of comments after blog posts. If students in a class each maintained their own Site with artifacts throughout the school year, other students would be able to comment on their writing and offer suggestions. This feature is important for the students since they are able to receive quick feedback, from multiple perspectives, and make adjustments/improvements to their work.



One of the more significant features of Google Apps for Education is that students and teachers can work collaboratively on their artifacts. For a class project on the planets, a teacher could create a Slides project and make each student a collaborator (with the power to view and edit). Each student would be responsible for editing a slide with what they have learned. Students can comment on each other's slides if they notice errors or note if they have learned something new. At the end of the project, an entire collection of information on the planets would be produced. Teachers can also benefit from the collaborative features of GAFE. In staff meetings or team meetings, multiple teachers can add to a Doc or Sheet at the same time. If one teacher notices an error that another teacher wrote, they can immediately fix it. Teachers can more easily divide an conquer and split up sections of a table when entering student data and since it is all on the same document at the same time it eliminates the pain of transferring data from one document to another.

Google Apps for Education also enables students to think about their own thinking (metacognition). Since GAFE offers many choices for creating artifacts students can analyze if the app that they chose was the best way to meet the requirements for the assignment or not. Another more significant way GAFE lends to metacognition is through using Sites for the purpose of ePortfolios. Throughout the school year, students can embed artifacts of their learning and spend time reflecting on them. They will then begin to notice patterns in their writing style and brainstorm how to improve their processes for future assignments. When the ePortfolios are used year-to-year, students can visually measure their own growth as learners and identify their strengths and weaknesses. This can also be observed through Drive since every document created in GAFE is automatically saved there and can be accessed at any time.

Our classrooms are filled with unique learners and therefore our lessons need differentiation. Google Apps for Education offers many types of differentiation. The Chrome Webstore offers many applications that can be added to GAFE (most at no

cost). There are apps for speech-to-text for those who experience difficulty with the fine motor skills required for typing , text-to-speech for those who need assistance in reading and an app that publishes the same news articles at five different Lexile levels for all levels of readers. Another app, Doctopus, lets teachers easily push out differentiated documents to students at the same time. They can create three versions of the same reading (each at different levels), tell Doctopus which students need which version, and it sends it to the appropriate student at the same time. Students with special needs are then not singled out in front of their peers.

Google Apps for Education enables students to learn any time/anywhere, become active knowledge producers, develop artifacts with multimodal meaning, receive recursive feedback, collaborate with teachers and peers, think about their own thinking as well as received supports for their individual learning.

Google Apps for Education also reflects Gardner's theory of Multiple Intelligences.

Gardner defines intelligence as:

> -the ability to create an effective product or offer a service that is valued in a culture;
>
> -a set of skills that make it possible for a person to solve problems in life;
>
> -the potential for finding or creating solutions for problems, which involves gathering new knowledge ("Howard gardener").

GAFE's applications allow students the ability to create products that have value in our culture. They are able to create websites, presentations and other works that hold significant information and are easily shared with others over the internet. Since GAFE is multimodal, it also allows students to develop a set of technological skills that helps them problem solve. Students are able to embed links for more information, insert images and videos for clarity as well as choose the app they feel will best communicate their information. Students are also able to access tools like Researcher in their apps to gather new knowledge in their research.

Gardner also identified nine specific multiple intelligence. The theory states that we have each of these intelligences but the prevalence of each differs person to person ("Howard gardner"). Below is a description of each of these and how GAFE helps supplement them.

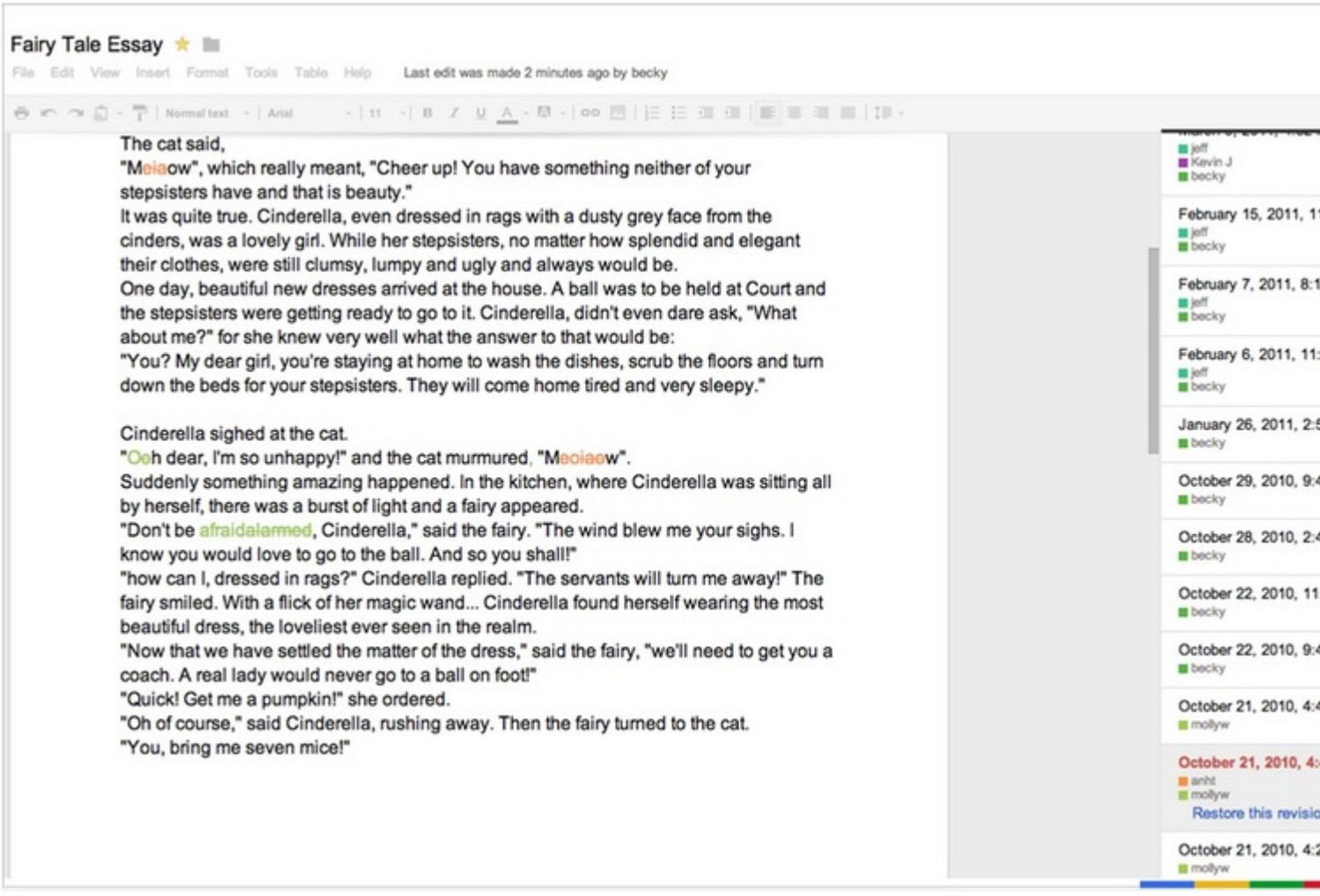
Intelligence	**How GAFE Supplements It**
Linguistic Intelligence: to use language to express what's on your mind and to understand other people	-Word processing/written language on Docs, Sites, Slides, Gmail -Reviewing comments from others on documents
Logical/Mathematical Intelligence: to understand logic and manipulate numbers & operations	-Data manipulation and formulas in Sheets
Musical Rhythmic Intelligence: to think in music/hear and recognize patterns	-embed video with audio to enhance a work in Slides, Sites & Docs
Bodily/Kinesthetic Intelligence: the capacity to use your body to solve a problem/ make something	-embed video of simulation, reenactment, dance/ other physical movement to enhance a work in Slides, Sites & Docs
Spatial Intelligence: to represent the spatial world internally in your mind	-Design original images in "Insert Drawing" feature -Present picture and text in a visually appealing and logical way in Slides, Docs and Sites
Naturalist Intelligence: the ability to discriminate among living things and sensitivity to other features of the natural world	-Use Google's search engine and Researcher tool to find images, video and other articles related to the natural world

Intelligence	How GAFE Supplements It
Intrapersonal Intelligence: having an understanding of yourself; knowing who you are, what you can do, what you want to do	-Reflect on learning from documents stored in Drive or ePortfolio created in Sites
Interpersonal Intelligence: to understand other people	-Make comments and provide constructive feedback on works shared with you
Existential Intelligence: to ask questions about life, death, and ultimate realities	-Ability to research and present these questions on a Site or comment visible to an online community

Classroom Examples

Google Apps for Education has many positive implications when used in the classroom. Below are a few examples of classroom projects and how GAFE helps meet student learning needs.

Fairy Tale Example



Students are assigned the task of collaborating on an original fairy tale for a creative writing class using all the elements of a fairy tale that they have previously learned about. The students use Google Docs to work on the assignment. One student creates a Doc titled "Fairy Tale Essay" and shares it with his group members giving them the rights to view and edit the document. During class time, the students are each on the same Doc on their own computers discussing the theme and storyline for their fairy tale. As one student types, every other student can view the list. Outside of class two students decide to add to the story; one types from her iPad and then other from his Android phone. A third group member opens the doc at breakfast the next day and edits the wording of a few sections of his team member's writing. Later that day, before class, the teacher highlights a few sections of the document and adds feedback like "Which character is saying this?" and "This description is too vague." The students see these comments when they open the Doc in class and immediately address the concerns, improving their paper. When the students are ready to submit their fairy tale, they send a notification to her Gmail account.

This classroom example demonstrates how GAFE enables ubiquitous learning since the students are able to work on their assignment from any device (computers, phones, iPads, etc.) from anywhere (school and home) at any time (school day, before school, after school). This aspect is valuable to students, especially in a creative writing project, since ideas may come at any time of day. The students can immediately add to their project when they have an idea which brings the learning to a 24hr time period as opposed to only being kept in a 45 minute class period.

GAFE also lets the students receive recursive feedback from their teacher. Since the document can be shared with their teacher, the teacher can then read the drafts at any time and offer constructive criticism as she sees fit. The students can then adjust their assignment accordingly. This type of formative check in helps students improve their writing and grade much more than a summative check or grade at the end of the assignment when no alterations may be made.

Using Google Docs made it easy for the students to collaborate on this assignment. The students all shared access to the same document. They did not need to cut and paste sections individually to a document or each view each other's separate documents. The students were able to edit each other's writing and offer suggestions through comments to strengthen their piece.

ePortfolio Example

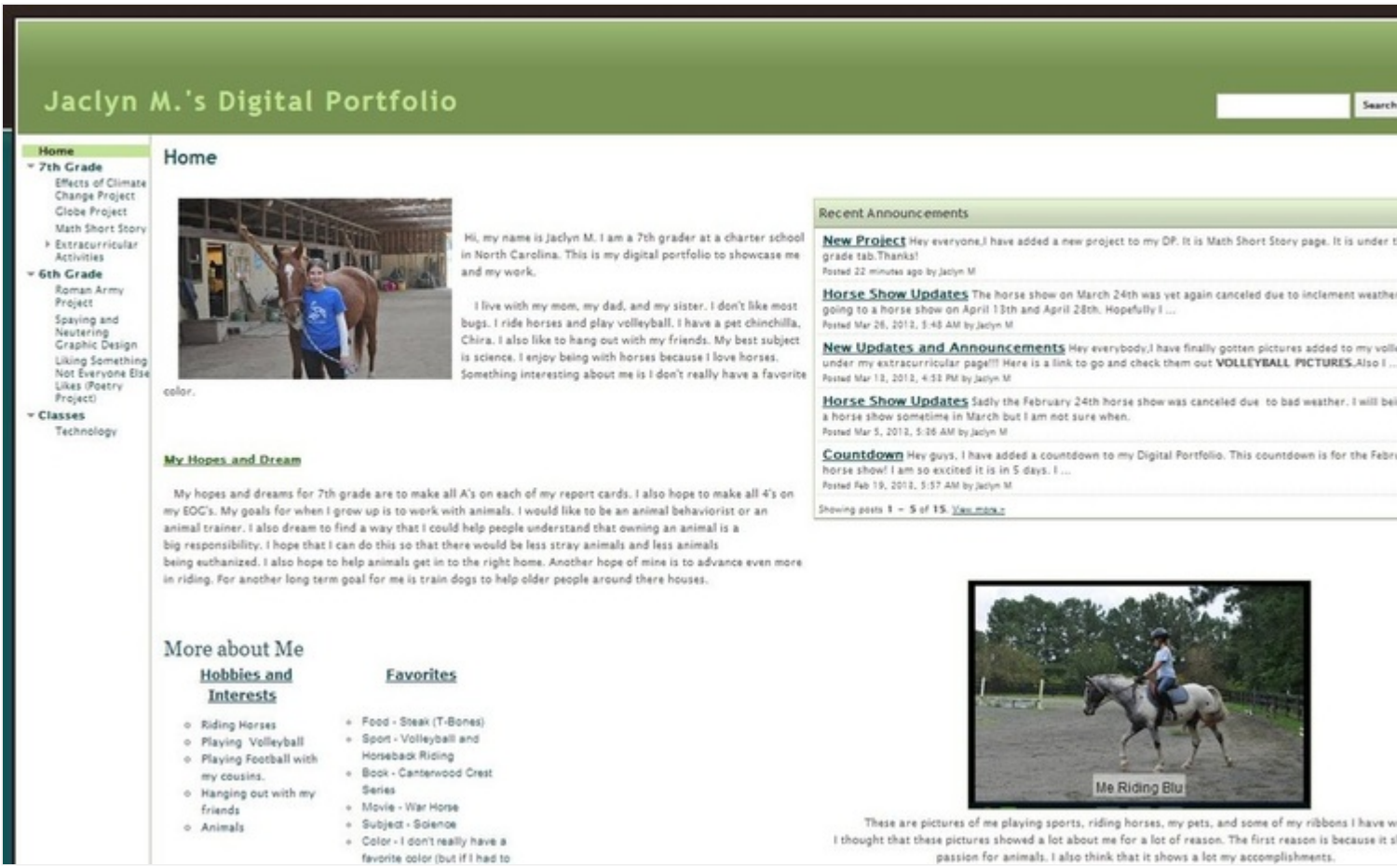
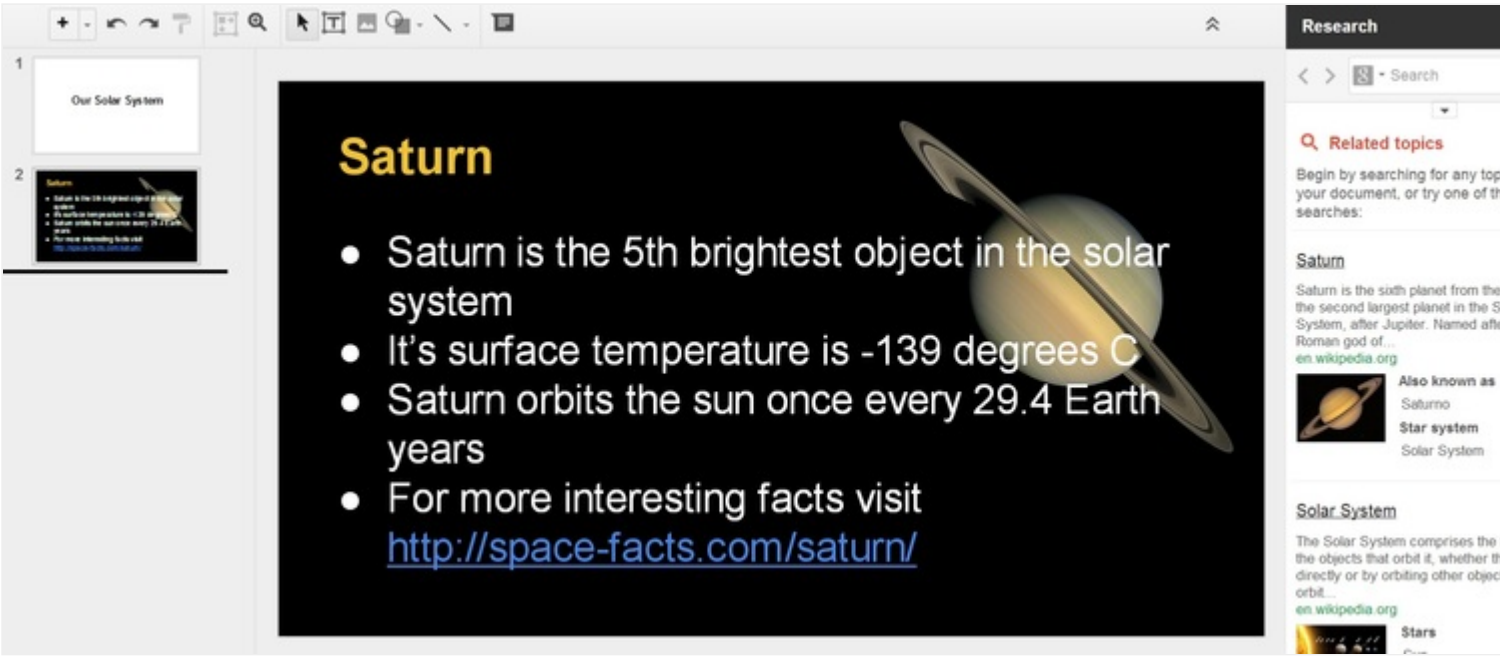


Image from http://www.mscomputerteacher.com/uploads/1/3/6/4/13643128/4871675_orig.jpg

A middle school decides that each student must keep a digital portfolio (or ePortfolio). The students are expected to add artifacts to their portfolio every year and will be given time during their advisory period throughout each school year to do so. It is up to each student to select the artifacts to place on their ePortfolio each year. Each year students are expected to add an update to their "About Me" page, a reflection at the start and end of each year of their aspirations, and at least six artifacts. Students and teachers will evaluate the ePortfolio at the end of each school year.

Requiring students to maintain and reflect upon a portfolio of their school work improves a student's metacognition. Metacognition is important for learners to grow. They must think about their own thinking, notice patterns in their learning and adjust in order to meet the goals they have set for themselves. If a student's goal is to improve their writing, they may choose to include multiple writing artifacts in the ePortfolio. They may then reflect on their style of writing and the feedback they have received from teachers and peers. They may then make adjustments to further work toward this goal.

Solar System Example



In order to learn about the different planets in the solar system, a teacher assigns students a planet to research for the class. He creates a presentation template on Google Slides and shares it with each student. Each student can access the slideshow at the same time and each add information to their own slides. Students are asked to use the Google Researcher tool within the app to find information. The teacher requires the students to include at least one hyperlink, one picture and three important facts on their slide. As students are working on their slides, they must also visit at least three other slides and comment on them. The comments may suggest corrections or observations. Students may then make corrections to their own slides. Struggling readers can also highlight a word and right click to "define" words on other student pages that they may not know.

This assignment accomplishes many learning goals. Students will learn how to given their artifacts multimodal meaning since they are required to include pictures, hyperlinks, and text in their explanation. Their pictures may be of the planet, to help students better visualize it, a picture of their plant in relation to other planets to better show distance, etc. Google Apps for Education enables student to easily accomplish this since they can drag and drop photos into Slides and insert a hyperlink by pasting and clicking the space bar.

This assignment also lets students become knowledge producers as opposed to knowledge consumers. Slides lets students easily research their topic in an embedded window on their slide page. They have control of their search terms and what information they would like to share with the class. The teacher could have easily just provided the students with a solar system book or fact sheet, but instead, this project offers more meaning since the students are the authors.

This lesson can also be differentiated for the learners in the class. GAFE has many built in tools to help these learns. In this example, the class contains students who struggle with reading. GAFE has made it easy for them to search words that they do not know so that they may still understand what they read and write effective comments on other student slides.

Affordances and Constraints

Affordances	**Constraints**
easy to collaborate with others in real time	limited formatting options (Robertson, 2013, p.60)
works on any device (no compatibility issues)	only YouTube videos may be embedded

Affordances	Constraints
free and automatically updated (which enables more money to go to classrooms) (Nevin, 2009, p.35)	server hosted outside of the school district (when servers crash, Google must fix and schools must wait)
saves automatically with revision history (no loss of work and can reduce plagiarism since edits are visible to teacher) (Nevin, 2009, p.37)	Google Sites editing is not user friendly
receive formative feedback through comments so grades are not mysteries (Nevin, 2009, p.37)	students must have internet at school and home to access 24/7
develops metacognition (Drive stores all documents and students can reflect on assignments and comments)	only Docs and Sheets can currently be edited from a mobile device
easy to embed multiple types of media (pictures, hyperlinks, video, text)	

While GAFE does hold some frustrating constraints (especially limited video embedding and formatting options), they are drastically outweighed by the affordances. Google is also constantly working to make improvements to their apps based on teacher and student feedback. In time many of the current constraints will be eradicated in future updates.

Conclusion and Recommendation

I recommend using Google Apps for Education in any K-12 district. If students begin using GAFE in elementary school, by the time they reach high school they will have an extensive collection of educational artifacts. Since all of these artifacts are housed in one place and easily accessible from anywhere, students can reflect upon their learning, as well as share their learning with others. Students have the added bonus of these items being stored on Google's servers so they do not have to worry about losing documents or needing to convert old files.

Google Apps for Education has helped address several issues in educational technology. They have helped schools offer an inexpensive means to easily collaborate between students and staff as well as move learning beyond the walls of the classroom. Each app in the Google suite can be shared with others so that they may access it anytime, anywhere, from any device since the product is hosted on the web.

GAFE also supplements Collaborative/Reflexive Learning by enabling students to become knowledge producers (through their wide selection of applications) and producers of multimodal artifacts (easily embed text, video, pictures and hyperlinks). GAFE lets teachers provide students with recursive feedback on assignments (through live commenting) and differentiate lessons to accommodate individual student needs (with assistive technology apps and embedded features). Students also develop metacognitive skills as they evaluate the artifacts Google Drive automatically collects for them throughout their school years. Google Apps for Education is truly transforming the ease and accessibility of educational technology.

For Further Study

Google Apps Main Site

40 Ways to Use Google Apps in the Classroom

Classroom App- Coming September 2014

Differentiating with Google

Create ePortfolios with Sites

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