INSTRUCTING CHILDREN IN THE USE OF COMPUTING TECHNOLOGY

THROUGH PHYSICAL CONNECTIONS WITH DIGITAL AND MOBILE DEVICES

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by

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San Marcos, Texas
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Kelsey Elizabeth Kite

2012

DEDICATION

This thesis is dedicated first and foremost to my Lord and Savior Jesus Christ without whom I would be separated from God and an entirely different person. To my parents who have loved me through the thick and thin and have supported and helped me as I work through this thesis. And to my friends and professors who have been ever encouraging and available when I needed them most.

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ABSTRACT

INSTRUCTING CHILDREN IN THE USE OF COMPUTING TECHNOLOGY THROUGH PHYSICAL CONNECTIONS WITH DIGITAL AND MOBILE DEVICES

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Mobile technology such as smartphones and tablet computers are growing in popularity. These devices are already starting to make an impact not only on individuals, but numerous areas of society. Children can greatly benefit from learning how to utilize these tools in a parent-directed method that encourages discovery and creativity. An understanding of these devices is predicted to benefit them throughout their education and future career.

To address this understanding, this thesis proposes the design of a short

activity book to be used for children aged 4-8 working alongside a parent. The activity book will be used by parents to teach their children how they can use smartphones, and tablet computers, for productive purposes and creative endeavors and to encourage children to become excited self-educators.

CHAPTER I

INTRODUCTION

Emerging technology, specifically smartphones and tablet computers, have only been widely popular for the last several years. Today, over 30% of adults in the United States of America (US) own a smartphone (Smith, “Smartphone Adoption and Usage”). As these technologies continue to rise in popularity, they are increasingly relied upon for everything from sharing photographs and ideas to research and business. Areas of one’s everyday life are affected from grocery shopping to education and healthcare. It stands to reason that these devices will continue to evolve and become more important and integrated in one’s day-to-day life.

Technology Advancement Trends

The progression of mainstream technological advancements has been rapid over the past couple of decades. Smartphones have brought about the next step of connection to the world: they remove the need for an expensive computer for access to the Internet. Information and communication has reached increased levels of connectivity, with the wide-spread adoption of this technology (Chen and Guizani, p.113). The freedom that these devices provide allow for more active interaction with others and the digital world. One can look up information in countless locations from some forests to the grocery store. These devices also allow for an enhanced interaction with one’s surroundings through such developments like Augmented Reality, which is the overlapping of digital visual content on top of the real world.

As interaction with and reliance upon emerging technology becomes increasingly common, the push to utilize it in one's everyday life increases. A Google Books search shows this push to utilize emerging technologies specific to education. Teachers are being encouraged to integrate these devices into the classroom. Numerous books have already been published discussing their benefits and instructing teachers in how to include smartphones and other technology into their daily lessons like *Engaged Learning With Emerging Technologies* (Hung and Khine). As a result of this, teachers have reported that including technology in class makes students "more motivated to learn (51%), apply their knowledge to practical problems (30%) and take ownership of their learning (23%)" (Unleashing the Future).

As technology continues to progress, some recognize that it brings with it disadvantages. The New York Times series of articles entitled "Your Brain on Computers" addresses some of the major complaints about the ever-increasing use of technology by society as a whole. Specifically, in his article "Growing up Digital, Wired for Distraction", author Matt Richtel contends that the rampant use of cell phones, computers, and tablet computers develops young people who are distracted, impatient, and time-wasters. He cites cases of intelligent students who spend hours in front of a computer or on their smartphone; as a result they have a hard time staying on task and waste so much time that their grades suffer as homework goes undone. Also, they become so used to instant information via the internet that they often have trouble actually reading a book because, as one student puts it, "A book takes so long, I prefer the immediate gratification".

Despite valid concerns, emerging technology shows no signs of disappearing and many anticipate an increased reliance upon devices like the smartphone or tablet computers. In the same New York Times articles, Matt Richtel remarks, "[b]ut even as some parents and educators express unease about students' digital diets, they are intensifying efforts to use technology in the classroom, seeing it as a way to connect with students and give them essential skills. Across the country, schools are equipping themselves with computers, Internet access and mobile devices so they can teach on the students' technological territory" (Richtel). He gives an example where one school has invested in iPads to teach Mandarin and begun a class that teaches students how to use digital devices for music recording. The result, notes the school's principal, David Reilly, is that at-risk students are attending and reengaging with the class. One teacher at the school remarked, "If I'm not using technology, I lose them completely" (Richtel).

Digital Divide

The Digital Divide is a problem that has emerged and become increasingly apparent since the boom in popularity of personal access to computers and the Internet. Though, access to the Internet has become readily available for many, there are still large groups of individuals for whom this is not a reality (Riggins, pp.161-162). The Digital Divide is defined as "[a] term that describes the division of the world into two camps, those who have access to the Internet and other advanced information technologies and those who don't. The term highlights the issue that those who do not have access to such technology are potentially destined to futures where they will be at an economic disadvantage." ("digital divide") This division between those with computers and Internet access and those without is not only something that separates first world countries from

third world countries, but is a problem even within the US.

Not everyone is able to afford a computer and access to the Internet. However, the popularity and affordability of the smartphone is helping to combat this. This can be seen in the results of a survey by Speak Up which "[polled] students on their personal access to various electronic devices. In regards specifically to mobile devices, the results are significant in two areas: First, smartphone access for middle and high school students jumped up 42% from 2009 to 2010; Second, when the data for middle and high school students is analyzed for differences based upon school demographics such as qualification for Title 1 funding (as an indication of community poverty) or community type (urban, rural or suburban) there is relatively little or no difference in the data results. For example, 44% of high school students in Title 1 schools as well as in rural or urban schools in the Speak Up participant group say that they now have a smart phone; same percentage for students in suburban, non-Title 1 schools. At least on access to mobile devices, the traditional interpretation of the digital divide appears to be no longer relevant" ("New E's of Education: Enabled, Engaged, Empowered").

These smartphones offer personal access to the Internet to children that would probably not have had that same opportunity without them. These phones become a primary form of Internet access as "[s]ome 87% of smartphone owners access the internet or email on their handheld, including two-thirds (68%) who do so on a typical day. When asked what device they normally use to access the internet, 25% of smartphone owners say that they mostly go online using their phone, rather than with a computer. While many of these individuals have other sources of online access at home, roughly one third of these 'cell mostly' internet users lack a high-speed home broadband connection."

(Smith, “Smartphone Adoption and Usage”) Smartphones have started to become a bridge to the Digital Divide in the US.

Technology Effects

Emerging technologies already affect and will continue to transform countless areas of modern-day life. Just a few of these rapidly changing areas are politics, education techniques, shopping, travel, business, and healthcare. For example, healthcare is evolving so rapidly because of recent technology, professionals have been forced to acknowledge this as a new movement in their field. “This movement, known as Health 2.0, can be defined as: the use of social software and its ability to promote collaboration between patients, their caregivers, medical professionals, and other stakeholders in health” (Sarasohn-Kahn, 2008).

Retail is another area that is seeing great changes because of emerging technology—specifically smartphones. ComScore, Inc. released a report that found that “[m]ore than half of the U.S. smartphone population used their phone to perform retail research while inside a store in 2011, illustrating the emergence of savvy smartphone shoppers who bring online shopping behaviors in-store. At the end of 2011, nearly 1 in 5 smartphone users scanned product barcodes and nearly 1 in 8 compared prices on their phone while in a store” (“ComScore Releases the ‘2012 Mobile Future in Focus’ Report”). This is a significant change in the way that consumers interact with shops and was not a possibility before this emerging technology. This change brings about increased accountability to these businesses.

A third example of the effects of emerging technology is in education. Educators across the nation are seeing these tools change how students research, communicate, and

learn. One elementary school principal remarked, “The availability and effective use of digital resources will be an integral part of each classroom and the curriculum. It is still new and the learning curve is steep. By 2019, I expect that it will be a routine part of the instructional process” (“Unleashing the Future: Educators “Speak Up” about the Use of Emerging Technologies for Learning”).

CHAPTER II

TECHNOLOGY EDUCATION

At a young age, children in the US begin to interact with technology, as it is all around them. If they do not have the opportunity to play with a parent's phone or computer, they see these things in advertisements and in the possession of individuals around them—even some of their friends. In the US, over 30% of adults own a smartphone (Smith, "Smartphone Adoption and Usage"). This statistic does not include other devices or personal computers. Children in homes with access to emerging technology are already starting to interact with these devices. This can be seen simply by noting the thousands of games and educational apps directed toward and designed for children. Given the information coming out on current and future use of emerging technology in numerous fields ranging from education to healthcare, a well-informed understanding of this technology will be highly useful as a child grows up.

How Children Currently Interact with Technology

Since the release of smartphones, their popularity has grown steadily. These phones are not only used for making calls. Users are taking advantage of the many extra features on these devices. "Fully nine in ten smartphone owners use text messaging or take pictures with their phones, while eight in ten use their phone to go online or send photos or videos to others. Many activities—such as downloading apps, watching videos, accessing social networking sites or posting multimedia content online—are almost entirely confined to the smartphone population" (Smith, "Americans and Their Cell

Phones"). Even among all adult cell phone users, 54% send photos or videos and 44% access the Internet with their phones (Smith "Americans and Their Cell Phones"). Clearly, smartphones are being used for much more than just making phone calls or texting. These devices have become important personal tools. This goes beyond the vast areas of influence they have in business and education previously discussed.

A child not only can have access to a smartphone that an adult in his or her life owns, but some already have their own phone. Research shows that even children K-2nd grade have personal access to emerging technology. 21% have access to a cell phone, 16% to smart phones, 37% to laptops, 37% to MP3s, and 10% to tablet devices. (Table 1) Additionally, parents say that they would be willing to purchase a personal device for their child if it was needed for education ("New E's of Education: Enabled, Engaged, Empowered").

Table 1: Table of Personal Access to Mobile Devices for School Children ("New E's of Education: Enabled, Engaged, Empowered")

Table 1: Personal Access to Mobile Devices

Device	K-2	Gr 3-5	Gr 6-8	Gr 9-12
Cell phone (without internet access)	21%	29%	51%	56%
Smart phone	16%	19%	34%	44%
Laptop	37%	42%	60%	67%
MP3	37%	55%	79%	85%
Tablet device (iPad)	10%	8%	13%	10%

Opponents to these statistics point to the Digital Divide as causing too great of a chasm to allow for real wide-spread integration of emerging technology. While the Digital Divide is still an issue to consider, the divide is slowly "closing" due to smartphones as previously discussed.

The Benefits of Understanding Technology

As has been previously discussed, many children already have access to emerging technology whether it is their own device or an adult's. The question arises, however: How beneficial will developing an understanding in how to effectively operate these technologies be to the children in the future? One clear way is in their educational career. Plans for and the current use of emerging technology is a good indicator of how these tools will be used in the future. In a study by Speak Up, "…high school students say that they would use their mobile device at school: to check grades (74%), take notes in class (59%), use the calendar (50%), access online textbooks (44%), send an email (44%), learn about school activities (40%)" ("New E's of Education: Enabled, Engaged, Empowered"). Clearly, digital communication technologies are going to be welcome tools to students.

However, Patricia Greenfield, distinguished professor of psychology at UCLA and director of the Children's Digital Media Center in Los Angeles, would say that such technology has not been holistically beneficial. She argues, "[a]s technology has played a bigger role in our lives, our skills in critical thinking and analysis have declined," though she notes that "our visual skills have improved" (Wolpert).

Evidence that emerging technology's benefits more than likely outweigh its costs can be seen in other reports and real-world applications. Teachers report that by using technology, students are developing key 21st century skills including creativity (39%), collaboration (30 %) and skills in problem solving and critical thinking (27%); thus, effectively preparing them for future success in the workplace and the global society (Unleashing The Future). Kelly Walsh, a professional in information technology, adds to

the opinion that an early understanding and use of technology leads to better job marketability and preparedness saying that businesses even now are looking for employees that have a good understanding of the latest Internet tools (Walsh).

CHAPTER III

STATEMENT OF THE PROBLEM

Problems With the Current Way Children are Exposed to Technology

While many children do interact with emerging technology, and it is clear that understanding how to use it effectively will be beneficial to them in their futures, an approach for learning how to use this technology is lacking. Though a child may have access to a smartphone or tablet computer, few are given any directions in how they may use these devices in a constructive manner. Children are not shown the full breadth of what these tools can do and parents do not know how they can use these devices to teach and, especially, inspire their children to learn and explore technology on their own. A second major problem is that children are natural consumers of digital content but are not taught to be contributors. Emerging technology offers opportunities for creativity in several areas ranging from music and video to studio art. Children should learn to create and share their work. This offers the opportunity for parents to control what work is shared and how it is shared online and encourages discussion on Internet safety.

Children Are Not Learning Technology Purposefully

Children are often permitted to play with an adult's or their own smartphone, tablet computer, laptop, or MP3 player. While many of these devices boast relatively intuitive controls, exploration can become limited to a few favorite applications, games and other basic functions. One of the advantages of these tools, however, is the way in which they can enhance one's interaction with the world around them. As will be seen in

one of the activities explored in this thesis, apps like “Planet Finder” allow individuals to see depictions of planets, stars, and satellites moving across the sky where they would be in real time. These images also offer information about the celestial object being viewed at just a touch. This is just one example of a way that emerging technology can be used to go beyond the status-quo to inspire children to explore and learn. In Great Brittan, there is a push to expand the teaching of technology and IT in schools as proponents point to the need to “get away from teaching pupils the office skills they use already and excite them with the vast array of new technology available that will shape their lives and careers” (Streater).

The goal of using technology to encourage children to become life-long learners in and outside of the classroom has become a popular topic of discussion in schools. As one report on technology use in schools stated, “Students are already very effectively implementing this student vision of socially-based, un-tethered and digitally-rich learning on their own, in and out of school, with or without the assistance and support of their teachers or schools” (“New E’s of Education: Enabled, Engaged, Empowered”). This passion and pursuit should be encouraged by parents at a young age.

Contributors VS Consumers

Games, including educational games, are common among electronic programs developed for children. Though these are appealing to children, they can lack the ability to inspire children to continue to learn, keep them active, and teach them to be creative and to share their creativity.

Just soaking in the visual cacophony of media and technology is not enough for children. They should be creators of content, not just consumers of information. A book

search shows numerous studies that have been performed and books written on the creativity of children, their need for it and the benefits it brings to them. These benefits range from mental and physical health to crucial skills that will be used later on in live as they enter the work force. Alice Honig is just one example of such writers that encourage educators to support early childhood creativity as she writes about many of the benefits listed (Honig).

Neuropsychologist, Rex Jung, Ph.D., expressed the need for children to not sit and consume digital content, but to have space and time for their minds to connect elements in their surroundings and be creative thinkers. As he explained, “If you’re just a sponge, you may be able to regurgitate facts, but you can’t combine them in novel and useful ways” (Miranda). Speaking on media intake, Claire Green, the president of Parent’s Choice, an organization that helps inform parents on how they can best develop and get involved in their child’s growth outside of schools, recommended that “Kids need to have time to go outside and play, and pull from other experiences besides the media” (“Managing Your Child’s Screen Time”).

Hypothesis

This thesis will offer an alternative that allows for children to receive one-on-one interaction with a parent or guardian and to develop skills that will benefit them both now and in the future. The project proposes to combine traditional activity book elements with smartphone and tablet devices using the Internet and applications in order to teach children how to utilize these tools effectively and to foster creativity, active learning, and parent-child interaction.

Modern Technology to be Addressed

This thesis will utilize many of the modern and increasingly mainstream pieces of technology currently in use. The devices that will primarily be addressed are the smartphones, like the iPhone or Motorola RAZR MAXX XT910, and tablet computers, such as an iPad or the Samsung Galaxy Tabs. The other main tool to be utilized is the traditional activity book. Though the activities will focus on Smartphone use, many of them will be able to translate to a tablet computer depending on what device the family owns or what tool the parent would like to focus on in instructing his or her child. Secondary features will be addressed in the book or explored in an activity. Printed on the pages of the book will be well-known tools like Uniform Resource Locator (URL) addresses and more recent ones like Quick Response (QR) codes. On the digital devices, applications will be used to supplement the activities. In addition, some of the capabilities of these electronics will be highlighted, particularly the camera, video, and Internet connection. Finally, websites designed for this thesis will be used for supplementary activities and instruction.

CHAPTER IV

DIGITAL ELEMENTS TO BE INCLUDED

QR Codes

Any activity to be developed that incorporates an app will have a QR code printed readily available on the page to allow for easy access to download any app that is not already on the device. These codes may also be used to direct to a website, communicate a message, and more (Figure 1). A QR code is "[a] two-dimensional matrix bar code that is used to identify products. It can store up to 4,296 alphanumeric or 7,089 numeric characters.

Created by Japanese Denso Wave, Inc. and standardized by ISO, Japanese Industrial Standard (JIS), JEIDA and AIM, QR codes are increasingly used to identify the URL of a company's Web site so that mobile phone users can photograph the code and retrieve information about the organization." ("QR Code Definition from PC Magazine Encyclopedia")

Figure 1: A QR Code

Camera

Smartphone cameras are extremely popular tools in modern photography. Images taken on smartphones can be seen on most major social media websites, with the iPhone smartphone listed as the most used camera on Flickr, a popular photo-sharing website (Flickr). These cameras can have anywhere from a typical 5 to as much as 41.0 megapixels, which is more than some high-end digital cameras. The smartphone camera is a convenient and useful way to document and share events—whether small or life-changing. Children can learn both how to take photographs with the purpose of recording events and how to share approved photographs with family. These activities are designed to encourage creativity, strategic thinking, and real world interaction.

Websites

A main website will be developed, targeted toward the parents that will actively participate in the activities in the book. There, they will share their experiences with the activities in a forum setting. They can also make suggestions for future activities or suggest changes to current ones. Additionally, a new activity will be made available each week to keep the book relevant and promote continued interaction.

Smartphone Applications

Smartphone applications (apps) have increased in popularity since their beginning around five years ago. Today, thousands of apps exist and the market nets billions of dollars annually. A picture of this market can be seen in that “more than 65 million people have downloaded eBay’s apps for various devices, spending £3.2bn on the auction service from mobile devices in 2011. This is expected to rise to £5.1bn in 2012.” (Dredge and Arthur) Three of the four activities created for the book use an app as a central

component to the project. Apps allow the user to perform tasks and experience things that they can not with just a smartphone or similar device alone.

Augmented Reality

One other even more recent form of technology that would be included in order to impress and inspire the children would be augmented reality. “An extension of virtual reality, augmented reality combines real-world environment and computer-generated image or information so that users can feel more intuitive as they explore in a simulated ‘real’ world.” (Furht) In other words, augmented reality overlaps real-time digital imagery with the real world to enhance one’s interaction with their surroundings.

CHAPTER V

BOOK CONTENTS

Though the use of technology in today's society is very important, books have been a tool used for education and pleasure for centuries. Because of their use in education, children are generally familiar with physical books and so are their parents. This basis allows for those with even the least understanding of technology like smartphones to have a comfortable base from which to begin approaching using mobile devices. It also reemphasizes what many of the book's activities would teach: the fluid combining of the digital world with the real world.

Book Structure

The layout and other design choices made for the activity book are designed to appeal to both children and parents. The text is relatively simple and, though intended to be read by the parent and child together, it may be read by older children alone if they so desire. The colors were chosen for their cheerful qualities and ability to be combined well with one another visually. Illustrations were used in order to not only reference traditional children's books but to communicate more effectively the steps being described. The sections of various tips and suggestions are designed to allow participants to make the activities as involved or simple as they like. This feature also encourages users to re-do activities in order to try out variations. Finally, the size and shape of the book is similar to that of a smartphone. This allows readers to put the book in their pocket or purse along with their phone for easy transportation.

Cover

The front and back cover displays the front and back of an iPhone respectively. The illustration is intended to reflect and reemphasize the size of the book matching that of a common smartphone. It also indicates which type of phone would best work with the activities inside.

Figure 2: Back and Front Cover

Format

The book is laid out with three columns and a small margin around all sides of each page. The layout encourages the use of individual columns for additional information. This creates a pattern that helps readers to quickly understand by placement, color, and design what type of information or instruction a paragraph might include.

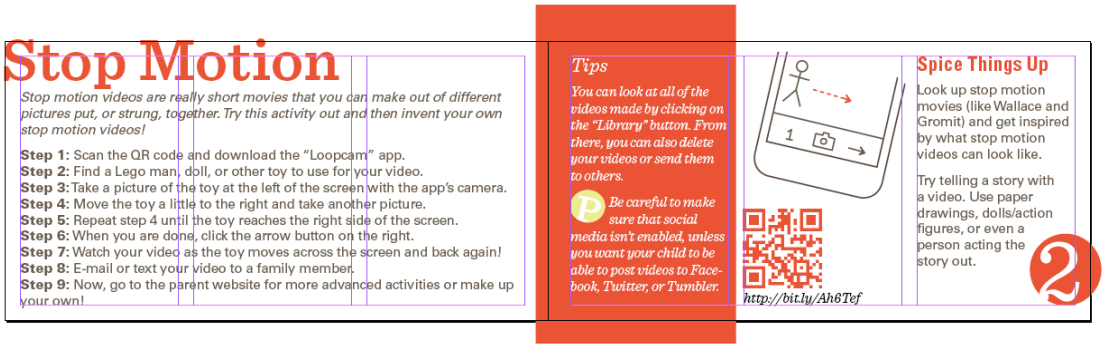

Figure 3: The Layout Seen Overlaid on an Activity Spread

Activities

Though in a complete activity book, there would be approximately ten to fifteen projects, it was determined that three were necessary to demonstrate and test the potential of the book. The activities developed were “Sky Gazing,” “Stop Motion,” and “Word Hunt.” Along with them, the initial “Getting Started” pages were developed.

Getting Started

Getting Started includes steps on how to start using a smartphone with the book. This is done by giving steps to download a necessary app and then use that app to scan the QR code. Other elements are described including the parental warning symbol to denote safety information and the parent website for additional activities. Also, the various subsections are introduced and give additional clarity to the layout of the book. The information for the steps is as follows. “Step 1: Go to the “App Store” (or other similar site) and search for “Scan”. Step 2: Install the “Scan” application. Step 3: Open the “Scan” app and place the QR code to the right inside the brackets that appear on the screen. That’s it! When the brackets turn green, the message, website, or more will pop up on your phone!”

Figure 4: Getting Started Information Spread

Project 1 Sky Gazing

The Sky Gazing activity uses an application that shows planets in their locations in the sky using Augmented Reality. Children are instructed to scan the QR code that will take them to the necessary app. Then they can see planets, stars, constellations, and satellites as they move across the sky. To enhance the experience, they are instructed to go to the parent website to print off extra learning material that brings what they are seeing to life and connect it to history, mythology, and more. This activity allows children and their parents to learn celestial statistics and history and gives them the tools to identify planets, constellations, starts, and even satellites by being able to see them identified and displayed over a view of their environment. Children are able to see how planets and the earth move and note how they compare with one another. Additionally, Augmented Reality is described and several tips and suggestion for further learning are given. The information for the steps is as follows. “Step 1: Scan the QR code and get the “Star & Planet Finder” app. Step 2: Pick a planet (or the Sun or Moon) to find. Step 3: Follow the circle with your smartphone to spot the planet. Step 4: Now, go to the parent website and print off the activity called “Sky Gazing: Planets” Step 5: Play the Greek god & planet matching game.”

Figure 5: Sky Gazing Activity Spread

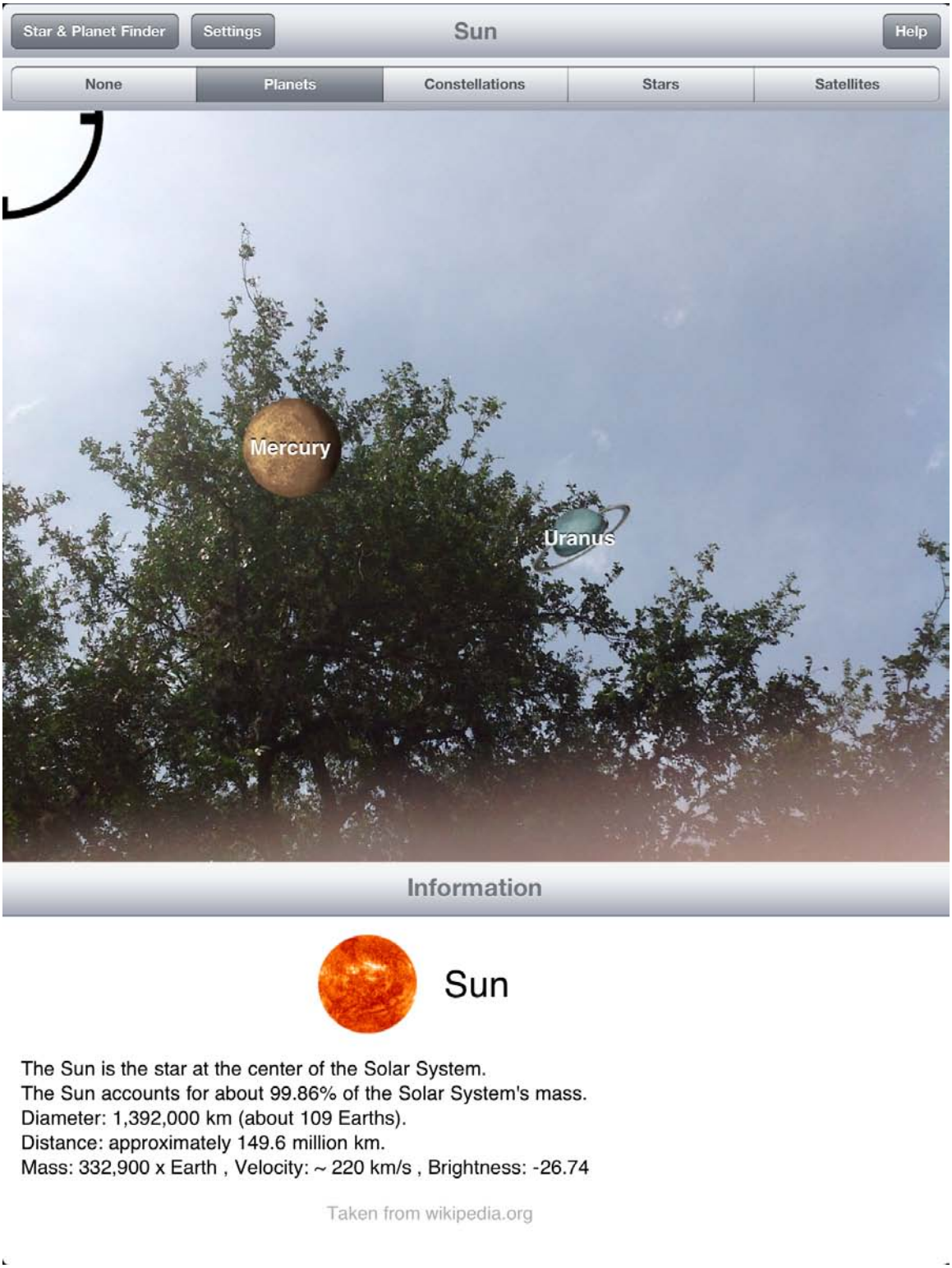

Figure 6: Viewing Planets in the Sky During the Day.

Project 2: Stop Motion

The Stop Motion activity directs children in how to create an animated stop motion video by stringing individual photographs together. It instructs children to download the necessary app and gives steps for a short, simple video for them to create in order to teach the basics of the app. This activity gives the child an outlet to use their creativity in a new manner. They also are able to uniquely see how videos are comprised of numerous individual images strung together. There are also other video subject suggestions for further information on how to explore the app and send videos to others. The information for the steps is as follows. “Step 1: Scan the QR code and download the “Loopcam” app. Step 2: Find a Lego man, doll, or other toy to use for your video. Step 3: Take a picture of the toy at the left of the screen with the app’s camera. Step 4: Move the toy a little to the right and take another picture. Step 5: Repeat step 4 until the toy reaches the right side of the screen. Step 6: When you are done, click the arrow button on the right. Step 7: Watch your video as the toy moves across the screen and back again! Step 8: E-mail or text your video to a family member. Step 9: Now, go to the parent website for more advanced activities or make up your own!”

Figure 7: Stop Motion Activity Spread

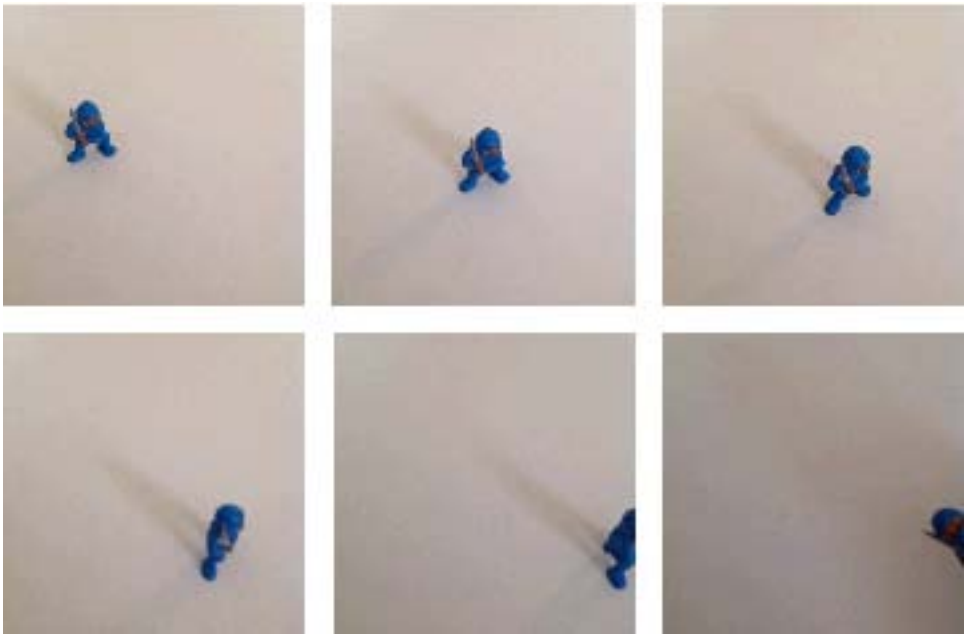

Figure 9: Stop Motion Activity Example

Project 3: Word Hunt

The Word Hunt activity instructs children in how to use the device's camera in a creative manner that is active, educational, and encourages documentation of the world they live in. In this activity, the child and parent work together even more closely than in the previous parts of the book. The parent encourages the child to match a card with a foreign word on it to the object in the home that the word describes. The parent does this by giving hints. Then, the child documents this by photographing each guess. Various languages can be included and taken from the parent website. In doing this activity, the child and parent not only learn some basic words from a foreign language, but they also learn how the smartphone could be used to augment what is taught in schools. It additionally gives the opportunity to learn about another culture. Parents are encouraged to even serve food derived from the culture whose language they learned that day. This

activity also includes troubleshooting suggestions and creative ways to further the theme of language and other cultures. The information for the steps is as follows. “Step 1: On the parent website, print off a note card sheet under the “Word Hunt.” (choose any language!) Step 2: Parent: Using the “Parent Key” under the language option, find out what each word means and how to pronounce it. Step 3: Cut out along the dotted lines to separate the words. Step 4: Parent: One at a time, give your child a card and practice pronouncing it together. Step 5: Parent: Give your child a hint as to what the word on their card might mean and send them through the home to find an object that matches their card. Step 6: Child: When you think you have found the object, place your card next to it and take a picture with the camera on your smartphone.

Step 7: Repeat steps 4-6 until all of the cards have been placed with an object and photographed. Step 8: Look at the pictures and see how well you both did in giving hints and guessing. Pronounce the words together as you look at each picture.”

Figure 9: Word Hunt Activity Spread

Figure 10: Word Hunt Activity Example

Parent Website

The Parent Website, is designed to both partner with the book activities and suggest entirely new activities. The site features “Home,” “Forums,” “Weekly Activity,” and “Print Offs” pages. The “Home” page displays a connection to other books that are a part of the same line and advertisements for ones that are in development. Additionally, a link is included to the “New Weekly Activity,” which can also be found in the navigation. At the bottom of the page is the comments, suggestions, and general contact form. This is found in the footer, the permanent strip at the bottom of the webpage that contains useful links for parents and Twitter and Facebook buttons (Figure 11). Next, the “Forums” page allows parents to share how they altered or improved an activity, ask for suggestions, and more. The posts are given a color by the writer of the post, which indicates what type of thread it is. The key for the colors is in the right-hand side of the footer (Figure 12). Finally, the “Print Offs” page is similar to the “Forums” page in its layout and use of a color key. It expands into subsections from a specific book to the individual activities in that book. Not shown in Figure 13, various printable pages would be found by clicking on the activity the parent might want to enhance or re-do with new information.

Figure 11: Parent Website: Home

Figure 12: Parent Website: Forums

Figure 13: Parent Website: Print Offs

CHAPTER VI

RESULTS

In order to determine the necessary short-term research on the success or projected success of the book, a survey was developed and given to one mother of a child that was within the target 4-8 age range.

Survey

Below are the survey questions that were used for interviewing a participating parent. along with the results of one such parent:

1. In your opinion, would the book and applications be effective in generating greater understanding and interest in a child in the use of digital devices such as smartphones?

Yes, having a book or site which could show the educational possibilities for which the smartphone could be useful would be of interest, especially if it could show how the phone could be a "tool" for learning and not just a toy at which to sit and stare.

2. Would you consider using this activity book to help instruct your children in the productive use of digital devices like smartphones?

Possibly. I realize that smartphones and similar digital internet devices are here to stay and are mainstream in this generation, but I prefer to motivate my children away from screen devices and toward hands on learning and moving

and playing and reading. However, using a smartphone for productivity rather than for idleness is attractive when compared. The problem is that kids don't seem to lean toward productivity when using technology. They tend toward zoning out and in my experience come away from "screen time" mentally dull and lazy. They seem mesmerized—less able to think critically, creatively, or quickly. They also for a time are unrelational and disconnected.

3. In today's environment, is the instruction in the use of digital devices such as smartphones an important topic for children in your opinion?

In my experience, it is the parent who needs the instruction. It seems that kids of all generations are somehow aware of the newest technology and its capabilities. They are, it seems, magically inclined to know how to use it.

4. Would/did you enjoy using the book and digital components?

Yes, I am interested in the creativity of the "stop motion" activity and find the "Sky Gazing" app fascinating.

5. Would/did your child enjoy using the book and digital components?

I did not use the booklet ideas with her yet.

6. Describe your child's or children's current or past interaction with digital devices including smartphones, touch MP3s or the computer.

See answer to #2 for the effect of digital devices.

**We have used the computer for researching things we are interested in.*

**We like that while reading a book we can quickly go to the computer to find pictures or video of places that we have read about.*

**We have a few web sites that we like to use with this young age for learning activities (www.sheppardsoftware.com) is one example.*

**We have found that there are several apps for use on an itouch that younger children can use for educational experiences.*

Based on this response, the book shows promise as a tool for parents and their children. In future versions of the book, however, activities that further emphasize interaction with the physical world while only using the smartphone as a tool to enhance that interaction should be developed. Also, it was determined that a page should be added to the parent website that gives information ranging from basic training in the use of a smartphone to more in-depth explanations of ways in which they can be daily tools and their capabilities. This would help parents who are less technologically savvy to learn ahead of their children and feel comfortable and knowledgeable in the use of a smartphone.

CHAPTER VII

CONCLUSION

The problems to be addressed were that children are currently not learning technology purposefully and that they are consumers of digital content but should become creators of content. To address this, the author developed an activity book that would be used by a parent and child together. The book teaches through activities some of the more advanced abilities of the smartphone as well as suggests practical ways of productively using the device's more basic abilities. The book is also designed to inspire further exploration of the tools introduced, including downloaded apps, in hopes of encouraging children to become life-long learners of technology. By eventually learning how to make anything from short video clips and interviews to collages and learning how to send these things to others or post them on their own blog, children will be well on their way to creating habits of sharing content with others using the Internet. Some of these described components would continue to develop in possible further expansion.

Tests to prove that these desired results would actually be achieved in the future and to test the current usefulness of the book would need to be performed. Another area for further research would be expansion of the book's activities and device-specific books.

Future Expansion and Research Possibilities

For further expansion and research, testing of the long and short-term effects of growing up using this book and enhancing digital knowledge and use would need to take

place. A short-term series of tests would need to follow a year of a number of children's use of the book, or series of books. It would need to take into account child age, parental involvement, socio-economic status, and location among other factors and would need to include an expanded pool of parent/child pairs in order to do this. A long-term test would need to include all aspects of the short-term test, but would have to be conducted over the duration of the children's life into adulthood. Results would reference technology use throughout the different stages of life and eventual career choices and success.

As has already been discussed, more activities would be added to the book. This would be along the same direction as the pages already developed. Some examples of these activities would include a family tree and interview project, a cooking steps and documentation project, and a walking route project.

Additionally, in future activities and expansion of the book, the child would be instructed in how to create a simple, private blog. This blog would be secure and only allow individuals specifically chosen to view content, like grandparents and other family members. Here, the child will be able to safely document their adventures and display videos and photographs from activities. In this manner, the child not only learns to be a creator of digital content, but can be taught how to share what he or she makes safely and wisely while under the guidance of a parent.

If expansion continued, alternate versions of the book would be developed. Specific books would be tailored to Androids and other popular smartphone brands in order to address any differences in the way each device functions. Various tablet computers would also be the focus of later books.

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