# Website to App: learning in your pocket Site para App: aprendizagem em seu bolso

#### Scott Heath

Instructional Design Coordinator Transfusion Medicine Education Program

scott\_heath@bonfils.org

Daniel Ambruso, MD Medical Director for Research and Education Bonfils Blood Center United States

daniel\_ambruso@bonfils.org

**Abstract**: In addition to new structures and elements within web pages, HTML5 offers the potential to create free-standing apps that run on smart phones or tablets (iPod, iPhone, Android devices). Instructional Designers are always challenged to find ways to engage learners in their chosen domain. The mobile web is one path that HTML5 is opening to non-technical individuals. Using only the skills needed to create a website, educators can now create web pages with enhanced interactivity, personalization, and convenience, which can also be made into apps (portable programs) that run on a learner's smart phone or tablet. A hypertext presentation of clinical case-based scenarios serves as the example web-based instructional simulation for this exploration of the new HTML5 features and the potential for the mobile web in education.

#### INTRODUCTION

The term "Mobile Web" refers to web-based material that can be accessed from devices considered to be mobile, such as smart phones or tablets. Since a web browser is part of any such product, any website developed for instructional purposes can be easily adapted to run as an app on such a mobile device. This paper explores the reasons and methods for doing this, as well as the tools and complications of the process.

#### BACKGROUND

An instructional environment that can provide for rich presentation, personalization, and interaction with subject matter can provide the mechanisms of active learning, leading to more effective instructional interactions (JOBE, n.d.-a). The set of additions and enhancements that have recently become part of HTML are ideal for the creation of such web-based environments (JOBE, 2011-b).

As new capabilities are added to the web-page palette, designers can use any of several tools to check on which browsers can support which of these new features (DEVERIA, n.d.).

Interstate for support of HTML5, CSS3, SVG and more in desktop and mobile browsers.         Latest update: New feature added: placeholder attribute for input fields (March 19, 2012)         Search: Iocalstorage         I result found         Import state FAQ Resources         Search: Iocalstorage         I result found         Import state FAQ Resources         Show options       = Supported = Not supported = Partially supported = Support unknown         * Web Storage - name/value pairs - working Draft       "Usage stats: Global Support:       Global Support:       670         Resources: Gecko reference       Supported import state for any of data (sessionStorage and Index Storage, used to fall under HTML5).       Resources: Gecko reference Support library Simple demo         Show all versions       IE Firefox Chrome Safari Opera Opera Opera Opera Mini Mobile Android Br 6.0       3.6         Addition of 10.0       2.1         Sources: Gecko reference Support library Simple demo         Show all versions         IE Firefox Chrome Safari Opera		usem	buggestions	Feed C	Twitter					2.6k	22
Latest update: New feature added: placeholder attribute for input fields (March 19, 2012)         Search: localstorage         I result found         Import stats       FAQ       Resources         Compatibility tables         Browser comparison         Show options       = Supported       = Not supported       = Partially supported       = Support unknown         Web Storage - name/value pairs - working brant       * Usage stats:       Global         Support       Total:       870       Resources       1         Method of storing data locally like cookies, but for larger amounts of data (sessionStorage and locally like cookies, but for larger amounts of data (sessionStorage and locally like cookies, but for larger amounts of data (sessionStorage and locally like cookies, but for larger amounts of data (sessionStorage and local local ly like cookies, but for larger amounts of data (sessionStorage and local local ly like cookies, but for larger amounts of data (sessionStorage and local local ly like cookies, local Storage, used to fail under HTML5).       Resources:         Show all versions       IE       Firefox       Chrome       Safari       Opera       Opera       Conce         Show all versions       IE </th <th>npatibility tabl</th> <th>es for suppo</th> <th>rt of HTML5, C</th> <th>SS3, SVG and mo</th> <th>ore in desktop</th> <th>and mobile b</th> <th>rowsers.</th> <th></th> <th></th> <th><b>Q</b> +1</th> <th>0 F</th>	npatibility tabl	es for suppo	rt of HTML5, C	SS3, SVG and mo	ore in desktop	and mobile b	rowsers.			<b>Q</b> +1	0 F
Search: localstorage         I result found         Import stats       FAQ Resources         Compatibility tables       Browser comparison         * Show options       = Supported = = Not supported = = Partially supported = = Support unknown         * Web Storage - name/value pairs - working Draft       * Usage stats: Global Support: = 87         Method of storing data locally like cookies, but for larger amounts of data (sessionStorage and localStorage, used to fall under HTML5).       Resources:         Show all versions       IE Firefox Chrome Safari Opera ioS Opera Opera Noble Android Br Multi Mobile Android Br Multi Andria Br Multi Android Br Multi Android Br Mu		Li	atest update: <u>New</u>	feature added: plac	eholder attribute	e for input fields	(March 19,	2012)			
localstorage         1 result found         Import stats       FAQ       Resources         Compatibility tables       Browser comparison         Show options       = Supported       = Partially supported       = Support unknown         * Web Storage - name/value pairs - working Draft       * Usage stats: Global         Supported       = Partially supported       = Support unknown         * Web Storage - name/value pairs - working Draft       * Usage stats: Global         Support data locally like cookies, but for larger amounts of data (sessionStorage and local support:       Colspan="2">Colspan="2">Colspan="2">Colspan="2">Support library Simple demo         Resources: Gecko reference       Support library Simple demo         Show all versions       Te Firefox       Chrome       Safari       Opera       Solspan=       Support library Simple demo         Current       9.0       11.0       2.2         Add to all versions       Te Firefox       Chrome       Safari       Opera       Solspan					Search:						
I result found       Import state       FAQ       Resources         Compatibility tables       Browser comparison       = Not supported       = Partially supported       = Support unknown         Web Storage - name/value pairs - working Draft				localstorage							
Import stats       FAQ       Resources         Compatibility tables       Browser comparison       = Not supported       = Partially supported       = Support unknown         Web Storage - name/value pairs - working Draft       = Support unknown       = Usage stats:       Global         Wethod of storing data locally like cookies, but for larger amounts of data (sessionStorage and ocalStorage, used to fall under HTML5).       = Trefox       Chrome       Safari       Opera       Safari       Opera       10.0       2.1         Resources:       Good       3.6       10.0       17.0       5.0       4.2-4.3       11.0       2.2         Rear ture       10.0       12.0       19.0       5.2       12.0       0       0.0       1.0 <td></td> <td>-</td> <td></td> <td>1 1</td> <td>result found</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		-		1 1	result found						
Compatibility tables       Browser comparison         Show options       = Supported       = Not supported       = Partially supported       = Support unknown         Web Storage - name/value pairs - working Draft       Lusage stats:       Global         Method of storing data locally like cookies, but for larger amounts of data (sessionStorage and ocalStorage, used to fall under HTML5).       Partial support:       87         Resources:       Gecko reference       Support library       Simple demo       Total:       87         Show all versions       IE       Firefox       Chrome       Safari       Opera       Copera       Copera       Mini       Mobile       Android Br         Show all versions       IE       Firefox       Chrome       Safari       Opera       IOS       Safari       Opera       10.0       2.1       2.3         6.0       3.6       10.0       17.0       5.0       4.2-4.3       11.5       3.0         current       9.0       11.0       18.0       5.1       11.6       5.0       5.0-6.0       12.0       4.0         variar future       10.0       12.0       19.0       5.2       12.0       10.0       12.0       4.0	dex Table	S						Import sta	ts FAQ	Resources	Embe
Show options       = Supported       = Not supported       = Partially supported       = Support unknown         Web Storage - name/value pairs - working Draft       = Usage stats:       Global         tethod of storing data locally like cookies, but for larger amounts of data (sessionStorage and bcalStorage, used to fall under HTML5).       = Support library       Simple demo         Resources:       Gecko reference       Support library       Simple demo       10.0       2.1         ihow all versions       IE       Firefox       Chrome       Safari       Opera       Opera       Opera       Opera       Opera       Mobile       Android Br         10.0       2.1       6.0       3.6       3.2       11.0       2.2       1.0       2.2         7.0       9.0       11.0       18.0       5.1       11.6       5.0       5.0-6.0       12.0       4.0         urrent       9.0       11.0       18.0       5.2       12.0       4.0	ompatibility tables	Browser co	mparison								
Show options       = Supported       = Not supported       = Partially supported       = Support unknown         Web Storage - name/value pairs - working Draft       Image: Support and Support in the supp						De stalle en				en contra	
Model Storage - name/value pairs - working Draft       Laster of all under hor larger amounts of data (sessionStorage and calStorage, used to fall under HTML5).         Resources: Gecko reference Support library Simple demo         Mow all versions       IE       Firefox       Chrome       Safari       Opera       Opera       Android Br         how all versions       IE       Firefox       Chrome       Safari       Opera       Safari       Opera       Molini       Android Br         how all versions       IE       Firefox       Chrome       Safari       Opera       Safari       Molini       Molini       Android Br         how all versions       IE       Firefox       Chrome       Safari       Opera       Safari       0.00       2.1         6.0       3.6       17.0       5.0       4.0-4.1       11.1       2.3       3.0         nurrent       9.0       17.0       5.0       4.2-4.3       11.5       3.0         uarrent       10.0       12.0       19.0       5.2       12.0       10.0       12.0       4.0         ear future       10.0       12.0       19.0       5.2       12.0       10.0 <td>Show options</td> <td></td> <td>= Suppor</td> <td>ted <b>m</b> = Not s</td> <td>upported</td> <td>= Partially sup</td> <td>oported</td> <td>= Su</td> <td>pport un</td> <td>known</td> <td></td>	Show options		= Suppor	ted <b>m</b> = Not s	upported	= Partially sup	oported	= Su	pport un	known	
Web Storage - name/value pairs - working Draft       Support:       Support:       Storage         Method of storing data locally like cookies, but for larger amounts of data (sessionStorage and healStorage, used to fall under HTML5).       Partial support:       Storage         Resources: Gecko reference Support library Simple demo       IE       Firefox       Chrome       Safari       Opera       Opera       Opera       Mobile       Android Br         ihow all versions       IE       Firefox       Chrome       Safari       Opera       Opera       Opera       Mobile       Android Br         ihow all versions       IE       Firefox       Chrome       Safari       Opera       Opera       Android Br         ihow all versions       IE       Firefox       Chrome       Safari       Opera       10.0       2.1         6.0       3.6       -       -       -       3.2       11.0       2.2         7.0       9.0       17.0       5.0       4.2-4.3       11.5       3.0         urrent       9.0       11.0       18.0       5.1       11.6       5.0       5.0-6.0       12.0       4.0         tear future       13.0       20.0       -       -       -       -       -       -							*1	leano eta	ter	Globa	
Partial support:       Total:       Colspan="4"         Colspan="4">Partial support:       Total:       Colspan="4"         Colspan="4">Chrome       Safari       Opera       Opera       Opera       Opera       Mini       Mobile       Android Br         Soft colspan="4">Chrome       Safari       Opera       Opera       Opera       Opera       Mini       Mobile       Android Br         Android Br         Soft colspan="4">Chrome       Safari       Opera       Opera       Opera       Mini       Mobile       Android Br         Android Br         Android Br         Android Br         A.0       3.2       11.0       2.2         A.0       0.0         A.0       10.0       2.0       A.0       0.0         A.0       10.0       10.0       2.0	Web Stora	de - name	e/value pairs	5 - Working Draft			Sun	ant and		Gioba	07 520
Total:       Total:       87         Total:       Total:       87         Resources: Gecko reference Support library Simple demo         IE       Firefox       Chrome       Safari       Opera       Opera       Opera       Mini       Mobile       Android Br         Solution of the state of t		ise nume	and the second	and the second s			Sup	JOIL.			07.33
IE       Firefox       Chrome       Safari       Opera       IOS       Opera       Mini       Mobile       Android Br         6.0       3.6	lethod of storing	a data locally	like cookies, but	for larger amounts	of data (sessio	onStorage and	Part	ial support	:		0.429
Show all versions         IE         Firefox         Chrome         Safari         Opera         Opera Mini         Opera Mobile         Android Br Mobile           6.0         3.6         -         -         -         3.2         11.0         2.1           6.0         3.6         -         -         -         3.2         11.0         2.2           7.0         9.0         -         -         -         4.0-4.1         11.1         2.3           8.0         10.0         17.0         5.0         4.2-4.3         11.5         3.0           Current         9.0         11.0         18.0         5.1         11.6         5.0         5.0-6.0         12.0         4.0           Near future         10.0         12.0         19.0         5.2         12.0         -	1ethod of storing ocalStorage, use	g data locally i ed to fall unde	like cookies, but r HTML5).	for larger amounts	o <mark>f data (</mark> sessio	onStorage and	Part	ial support I:	:		0.429 87.959
6.0         3.6         9.0         10.0         17.0         5.0         9.0         4.2         4.0         11.1         2.3           Near future         10.0         12.0         19.0         5.1         11.6         5.0         5.0         12.0         4.0           Farther future         13.0         20.0         9.0	Nethod of storing ocalStorage, use Resources: Ge	g data locally i ed to fall unde	like cookies, but r HTML5). Support library	for larger amounts	of data (sessio	onStorage and	Part	ial support I:	:		0.42% 87.95%
6.0         3.6         3.2         11.0         2.2           7.0         9.0         4.0-4.1         11.1         2.3           8.0         10.0         17.0         5.0         4.2-4.3         11.5         3.0           Current         9.0         11.0         18.0         5.1         11.6         5.0         5.0-6.0         12.0         4.0           Near future         10.0         12.0         19.0         5.2         12.0         10.0         10.0         10.0         10.0         10.0         5.2         12.0         10.0         10.0         10.0         10.0         5.2         12.0         10.0	nethod of storing ocalStorage, use Resources: <u>Ge</u> Show all versions	g data locally i ed to fall unde ecko reference IE	like cookies, but r HTML5). Support library S Firefox	for larger amounts Simple demo Chrome	of data (sessions) Safari	onStorage and Opera	iOS Safari	ial support I: Opera Mini	Opera Mobile	Android	0.429 87.959 Browse
7.0         9.0         4.0-4.1         11.1         2.3           8.0         10.0         17.0         5.0         4.2-4.3         11.5         3.0           Current         9.0         11.0         18.0         5.1         11.6         5.0         5.0-6.0         12.0         4.0           Near future         10.0         12.0         19.0         5.2         12.0         10.0         12.0         4.0	fethod of storing ocalStorage, use Resources: <u>Ge</u> Show all versions	g data locally i ed to fall unde ecko reference IE	like cookies, but r HTML5). <u>Support library</u> S Firefox	for larger amounts	of data (sessions) Safari	onStorage and Opera	iOS Safari	ial support l: Opera Mini	Opera Mobile 10.0	Android	0.42° 87.95° Browse
8.0         10.0         17.0         5.0         4.2-4.3         11.5         3.0           Current         9.0         11.0         18.0         5.1         11.6         5.0         5.0-6.0         12.0         4.0           Vear future         10.0         12.0         19.0         5.2         12.0         12.0         4.0           Farther future         13.0         20.0         0 </td <td>Method of storing ocalStorage, use Resources: <u>Ge</u> Show all versions</td> <td>g data locally i ed to fall unde ecko reference IE 6.0</td> <td>like cookies, but r HTML5). Support library S Firefox 3.6</td> <td>for larger amounts</td> <td>of data (sessions) Safari</td> <td>onStorage and Opera</td> <td>IOS Safari 3.2</td> <td>ial support l: Opera Mini</td> <td>Opera Mobile 10.0 11.0</td> <td>Android 2.1 2.2</td> <td>0.429 87.959 Browse</td>	Method of storing ocalStorage, use Resources: <u>Ge</u> Show all versions	g data locally i ed to fall unde ecko reference IE 6.0	like cookies, but r HTML5). Support library S Firefox 3.6	for larger amounts	of data (sessions) Safari	onStorage and Opera	IOS Safari 3.2	ial support l: Opera Mini	Opera Mobile 10.0 11.0	Android 2.1 2.2	0.429 87.959 Browse
Current         9.0         11.0         18.0         5.1         11.6         5.0         5.0-6.0         12.0         4.0           Near future         10.0         12.0         19.0         5.2         12.0         12.0         4.0           Varther future         13.0         20.0         0 <td>Iethod of storing ocalStorage, use Resources: Ge Show all versions</td> <td>g data locally i ed to fall unde ecko reference IE 6.0 7.0</td> <td>like cookies, but r HTML5). Support library S Firefox 3.6 9.0</td> <td>for larger amounts</td> <td>of data (sessions) Safari</td> <td>OnStorage and Opera</td> <td>iOS Safari 3.2 4.0-4.1</td> <td>ial support l: Opera Mini</td> <td>Opera Mobile 10.0 11.0 11.1</td> <td>Android 2.1 2.2 2.3</td> <td>0.42° 87.95° Browse</td>	Iethod of storing ocalStorage, use Resources: Ge Show all versions	g data locally i ed to fall unde ecko reference IE 6.0 7.0	like cookies, but r HTML5). Support library S Firefox 3.6 9.0	for larger amounts	of data (sessions) Safari	OnStorage and Opera	iOS Safari 3.2 4.0-4.1	ial support l: Opera Mini	Opera Mobile 10.0 11.0 11.1	Android 2.1 2.2 2.3	0.42° 87.95° Browse
Near future         10.0         12.0         19.0         5.2         12.0           Sarther future         13.0         20.0	nethod of storing ocalStorage, use Resources: Ge	g data locally i ed to fall unde ecko reference IE 6.0 7.0 8.0	like cookies, but r HTML5). Support library S Firefox 3.6 9.0 10.0	for larger amounts imple demo Chrome 17.0	s of data (session Safari	OnStorage and	iOS Safari 3.2 4.0-4.1 4.2-4.3	opera Mini	Opera Mobile 10.0 11.0 11.1 11.5	Android 2.1 2.2 2.3 3.0	0.42° 87.95° Browse
Farther future 13.0 20.0	Current	g data locally i ed to fall unde ecko reference IE 6.0 7.0 8.0 9.0	like cookies, but r HTML5). Support library S Firefox 3.6 9.0 10.0 11.0	for larger amounts	Safari 5.0 5.1	OnStorage and Opera 11.6	iOS Safari 3.2 4.0-4.1 4.2-4.3 5.0	Opera Mini	Opera Mobile 10.0 11.1 11.5 12.0	Android 2.1 2.2 2.3 3.0 4.0	0.42° 87.95° Browse
	Current Near future	g data locally i ed to fall unde ecko reference IE 6.0 7.0 8.0 9.0 10.0	like cookies, but r HTML5). Support library S Firefox 3.6 9.0 10.0 11.0 12.0	for larger amounts imple demo Chrome 17.0 18.0 19.0	Safari 5.0 5.1 5.2	ODESTORAGE AND ODES AND ODESTORAGE AND ODES	iOS Safari 3.2 4.0-4.1 4.2-4.3 5.0	Opera Mini	Cpera Mobile 10.0 11.0 11.1 11.5 12.0	Android 2.1 2.2 2.3 3.0 4.0	0.42° 87.95° Browse
Feed	Method of storing ocalStorage, use Resources: <u>Ge</u> Show all versions Current Vear future Farther future	g data locally i ed to fall unde ecko reference IE 6.0 7.0 8.0 9.0 10.0	like cookies, but r HTML5). Support library S Firefox 3.6 9.0 10.0 11.0 12.0 13.0	for larger amounts imple demo Chrome 17.0 18.0 19.0 20.0	s of data (session Safari 5.0 5.1 5.2	ODESTORAGE AND ODES AND ODESTORAGE AND ODES	iOS Safari 3.2 4.0-4.1 4.2-4.3 5.0	Opera Mini	Opera Mobile 10.0 11.1 11.5 12.0	Android 2.1 2.2 2.3 3.0 4.0	0.429 87.959 Browse
	Method of storing ocalStorage, use Resources: Ge Show all versions	g data locally i ed to fall unde ecko reference IE 6.0 7.0 8.0 9.0 10.0	like cookies, but r HTML5). Support library S Firefox 3.6 9.0 10.0 11.0 12.0 13.0	for larger amounts imple demo Chrome 17.0 18.0 19.0 20.0	s of data (session Safari 5.0 5.1 5.2	ODESTORAGE AND ODES AND ODESTORAGE AND ODES	iOS Safari 3.2 4.0-4.1 4.2-4.3 5.0	Opera Mini	Cpera Mobile 10.0 11.1 11.5 12.0	Android 2.1 2.2 2.3 3.0 4.0	0.429 87.959 Browse

Figure 1: www.caniuse.com

# THE BONFILS TRANSFUSION MEDICINE EDUCATION PROGRAM

Since 1990, Bonfils Blood Center in Denver, Colorado has been implementing hypertext-based instructional simulations covering topics in Transfusion Medicine (HEATH, HIGGS, & AMBRUSO, 2008). Since 2000, these have been translated into

HTML and offered from our website (www.bonfils.org/courseware/).

Currently, one of the four existing modules has been edited into XHTML form, and HTML5 features are being incorporated wherever possible.



Figure 2: A Bonfils Transfusion Medicine Education Program module

In the field of Medical Education, growing interest has been shown in both constructivist approaches and distance learning (WALSH et al., 2011). Comparisons of various forms of computermediated instructional presentations have shown the utility of these approaches, especially in illdefined, complex domains (CHARLIN & VAN DER VLEUTEN, 2004).

# ENTER HTML5

Several capabilities have been added to the programming language that provides the appearance and behavior of web pages. These added capabilities have been labeled 'HTML5". Although 5.0 is not an oficial designation, it has been so long since HTML 4.1 became an official standard that everything to come along since has been unofficially dubbed HTML5 (Lawson & Sharp, 2012).

# INSTRUCTIONAL DESIGN AND THE MOBILE WEB

A clearly marked path now exists for instructional materials designers to develop material for the web as well as for use in mobile devices (NIXON, 2011). The mobile device environment, however, includes a host of constraints and complications that the designer must deal with (MAXWELL et al., 2011)

Location	Mobile users can use their mobile device wherever they are.
Locomotion	Mobile users can use their mobile device on the go. Users may be walking, running, in a car, on a boat, or in any other manner of motion while using a mobile device.
Immediacy	Mobile users can use their mobile device at a moment's notice.
Intimacy	Mobile users may use multiple devices for different purposes, and a device's use can vary from a digital appendage to an occasionally used device for a specific personal or work task.
Device	Mobile devices vary greatly in form factor and capabilities.     Smartphones, eReaders, tablets, and other devices.

Figure 3: Mobile App design constraints

#### THE APPMOBI FRAMEWORK

Several commercial-level application development and deployment systems have become available just in the last few months. One is being made available at no charge under the name appMobi XDK (appMobi, 2011). The XDK stands for Cross-platform Development Kit, with support for iOS and Android for now, although Blackberry and Windows have come up in their forums.



Figure 4: The AppMobi XDK editor.

### MINIMAL FRAMEWORKS: GOOGLE ECLIPSE AND APPLE XCODE

The dominant programming environments for mobile devices are Apple's iOS (iPod, iPhone, and iPad) and Google's Android. These two require their own development environments: Apple's Xcode and Google's Android SDK.



Figure 5: The Apple Xcode editor.

#### CONCLUSIONS

New capabilities added to HTML support longstanding instructional design approaches, and many current mobile devices can use HTML5 websites. Support systems are becoming available that can allow nonprofessionals to create mobiledevice stand-alone apps. Designing those websites for use on mobile devices requires some design modification, both in terms of physical limits (screen size, interface options, etc.) and situational (in noisy rooms, outdoors, etc.).

## REFERENCES

CHARLIN, B., & VAN DER VLEUTEN, C. (2004). Standardized assessment of reasoning in contexts of uncertainty: the script concordance approach. *Evaluation & the health professions*, 27(3), 304-19. doi:10.1177/0163278704267043

DEVERIA, A. (n.d.). When can I use... Support tables for HTML5, CSS3, etc. Retrieved from http:// www.caniuse.com

HEATH, S., HIGGS, J., & AMBRUSO, D. R. (2008). Evidence of knowledge acquisition in a cognitive flexibilitybased computer learning environment. *Medical education online*, *13*, 16. doi:10.3885/ meo.2008.Res00261

JOBE, W. (n.d.-a). HIVE (Hypermedia Interactive Virtual Environment) – Utilizing HTML5 and instructional design to improve online learning. *SITE 2011 AACE* (pp. 3259-3265). Retrieved from http://www.editlib.org/p/36820

JOBE, W. (n.d.-b). The future of e-learning\_: interaction, collaboration and individualization

with. *SITE 2011 AACE* (pp. 1963-1971). Retrieved from http://www.editlib.org/p/39016

MAXWELL, A., LYNN, S., GUALTIERI, M., CLARK, J., BIERSDORFER, J. D., & NIXON, R. (2011). Mobile app design considerations for web designers. *Webdesigner Depot (online)*, 1-5.

NIXON, R. (2011). *HTML5 for iOS and Android A Beginner's Guide*. New York: McGraw Hill.

WALSH, C. M., ROSE, D. N., DUBROWSKI, A., LING, S. C., GRIERSON, L. E. M., BACKSTEIN, D., & CARNAHAN, H. (2011). Learning in the simulated setting: a comparison of expert-, peer-, and computer-assisted learning. *Academic medicine\_: journal of the Association of American Medical Colleges*, 86(10 Suppl), S12-6. doi:10.1097/ ACM.0b013e31822a72c7appMobi. (2011). Tutorial-Getting Started Install the XDK Create an XDK User Account. *XDK Quickstart Guide*. Retrieved from http://www.appmobi.com/ documentation/content/Tutorials/ Tutorial\_GettingStarted/index.html?r=5564