



ENVIRONMENTAL SCAN

# EMERGING TRENDS IN MOBILE MEDIA

Los Angeles County and Orange County

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**CENTER OF EXCELLENCE**  
**LA/Orange Counties**

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**Mission:** The Centers of Excellence, in partnership with business and industry, deliver regional workforce research customized for community college decision making and resource development.

**Vision:** We aspire to be the premier source of regional economic and workforce information and insight for community colleges.

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**Mobile access to the Internet exceeded desktop access for the first time in 2008. Information Technology professionals expect software application development for mobile devices will surpass all other platforms by 2015.<sup>1</sup>**

**– Source: IBM 2010 Survey<sup>2</sup>**

## Executive Summary

This scan examines the impact of the growth of mobile media on the workforce in Los Angeles and Orange Counties. One of the fastest growing information technology (IT) areas, mobile media, requires a new set of skills that is challenging the IT workforce and employers. The purpose of this scan is to begin the exploration of how community colleges can support the workforce needs of employers involved in mobile media.

The rapid growth in mobile media is fueled by the large numbers of people who already own smart phones, tablets or other devices with internet access. The design and development of content to be delivered on mobile devices takes place in the form of applications (that are downloaded on to the devices) or via mobile web sites. Businesses across industries have started to develop mobile websites and applications, using their existing employees, hiring new employees or using the services of marketing firms that specialize in mobile media. Mobile media also led to the development of new activities within companies, as well as the creation of new companies that have mobile media as their core business.

Six industries have been significantly affected by the popularity of mobile media: Software Publishing; Data Processing, Hosting, and Related Services; Internet Publishing and Broadcasting and Web Search Portals; Graphic Design Services; Computer Systems Design and Related Services; and Advertising Agencies. Although the development of mobile media is prominent in these industries, its use and impact is felt across all industries that use information technology and/or the internet.

The jobs specific to mobile media do not have separate codes and categories in the Employment Development Department's classification, therefore, it is difficult to quantify occupational demand at this time. However, many mobile media jobs are included in the following broader categories: computer programmers, computer software engineers (applications and systems), computer support specialists, web developers, multi-media artists and animators, and graphic designers. These occupations are projected to have high growth in the next five years, with high wages, and opportunities for advancement. Further research is needed to evaluate how many of these jobs require mobile media skills and expertise.

Ten employers were interviewed to gather some preliminary industry input on workforce development needs. All agreed that it is difficult to find job applicants with skills in mobile media. According to them, there is a shortage of application developers and mobile website developers, along with other mobile media workers. This is due to the fact that mobile media is relatively new and few people have learned the technology. At present, there are no college programs in mobile media in the LA/OC region, except at Golden West, that offers courses in application development (iOS, for Apple only),<sup>3</sup> leaving a strong need for more training in mobile media in the Los Angeles/Orange Region. Employers interviewed encourage colleges to create courses and programs in application development, mobile website development, and marketing using mobile media and social media.

<sup>1</sup> O'Connell, Michael, "New Developerworks Survey Shows Dominance of Cloud Computing and Mobile Application Development," October 8, 2010, press release, online at <http://www.ibm.com/developerworks/aboutdw/2010survey-results/index.html>

<sup>2</sup> The World in 2009: ICT Facts and Figures, Presentation at ITU Telecom World, October 5-8, 2009, online at [http://www.itu.int/ITU-D/ict/material/Telecom09\\_flyer.pdf](http://www.itu.int/ITU-D/ict/material/Telecom09_flyer.pdf)

<sup>3</sup> The term "application" in the mobile media software context is often abbreviated to just "app."

Mobile media is particularly relevant to the community colleges because it is a new technology that should be integrated in existing CIS programs to keep them up-to-date. In addition, employers' input revealed that traditional education is not always required for mobile media positions, as most employers seek people with a specific set of skills, with or without a degree. Job applicants who have the technical skills to create mobile websites and/or create apps on multiple platforms are in high demand, as evidenced by employers' input and secondary research.

However, addressing workforce development needs in mobile media is a complex issue for the colleges. The technology changes at a rapid pace; multiple platforms mean more systems to learn to use, and few people have the skills to teach classes in mobile media. In addition, the mobile media workforce varies significantly in education requirements (e.g. entrepreneur vs. mobile software engineer), skills requirements (competency in one or more platforms, programming skills etc.) and the number of workers involved in mobile media is still to be assessed. The Center of Excellence initiative is in the process of conducting a multi-region employer survey to gather more data and make recommendations to community colleges. The survey results are expected to be posted on our website in the fall of 2011.

## Introduction

The California Community Colleges System has charged the Centers of Excellence, part of the Economic & Workforce Development (EWD) Network, to identify industries and occupations with unmet employee development needs and introduce partnering potential for colleges.

In this report, we examine the emergence of mobile media, and its impact on workers who create mobile applications and mobile websites. The inauguration of wireless information technology made the internet portable and has brought new challenges to businesses. As new job skills, occupations, and careers emerge around mobile media, the community colleges' roles in preparing a skilled Information Technology (IT) workforce are shifting.

This report was prepared based on extensive secondary research and 10 employer interviews, to begin to identify mobile media occupations, skill requirements and trends. Continuing the study of mobile media, the Centers of Excellence are currently conducting a large employer survey in Northern and Southern California. The survey results will provide new data on the labor market and employment projections. The findings will include recommendations to community colleges, to meet employers' workforce development needs in the emerging area of mobile media. The second report is expected to be posted at [www.coecc.net](http://www.coecc.net) in the early fall of 2011.

## Understanding Mobile Media

Although one of the most popular uses of mobile devices is for gaming, the field of mobile media goes far beyond its use as a gaming platform. This report looks beyond the use of mobile media for specific applications like gaming or social networking, to a broad exploration of how mobile media is changing the information technology workforce.

The mobile internet expands existing voice and narrowband-data service to broadband and rich applications platforms. "Users increasingly expect anytime, anywhere access to data and services that not very long ago were available only while sitting in front of a computer linked to the network via a cable. In addition to the typical software for email, communication, and calendaring, new tools allow users to manage personal information (such as [Evernote](#), [Nozbe](#), [Wesabe](#), and [Triplt](#)), collaborate and easily access and share files ([Dropbox](#) and [CalenGoo](#) are two of many possible examples), or keep abreast of social networks ([Limbo](#), [Facebook](#), [Foursquare](#), [Whrrl](#)), and generally make checking and

updating work, school, or personal information flows something easily done on the fly.”<sup>4</sup> “Mobile is the new life for media and computers. There is no difference between the development of computers and both the future of computing and the idea of mobility. Using computers that are bound to fixed locations will become less relevant.”<sup>5</sup>

In addition to smart phones, the emergence of mobile technologies has created a proliferation of portable devices used for communication, entertainment and/or information processing. Media is downloaded on to mobile devices via streaming, pod-casting, broadcasting, or over the Internet. In addition, mobile devices are capable of geographic targeting, i.e. locating their users geographically, and further expanding their use as an interactive medium. The continual evolution of new mobile applications is fueling the dynamic nature of the technology and mobile media is seen as having “huge potential to enhance the lives of consumers, increase economic productivity and support eco-efficiency.”<sup>6</sup>

Information technology professionals predict that mobile and cloud computing (where programs are housed on distant servers rather than on a desk top or mobile device) will emerge as the most in-demand platforms for software application development and IT delivery over the next five years. Mobile and cloud computing are followed by social media, business analytics and industry-specific technologies as the hottest IT career opportunities beginning in 2011, according to a survey conducted by IBM. “Many IT professionals expect mobile software application development will surpass application development on all other traditional computing platforms by 2015.”<sup>7</sup> In fact, mobile access to the Internet exceeded desktop computer-based access for the first time in 2008.<sup>8</sup> A 2010 study showed approximately 3 million mobile-ready web sites, which represents a two-year growth of more than 2,000%. A recent Morgan Stanley report noted that the “mobile internet is ramping faster than desktop internet did and will be bigger than most think.”<sup>9</sup>

**“A 2010 study showed approximately 3 million mobile-ready web sites, which represents a two-year growth of more than 2,000%.**

**-dotMobi Study**

A Gerson Lehrman Group analysis observes that, “Similar to how mainframe computing evolved (but did not vanish) to client-server computing that later evolved to multi-tier Web-based and service-oriented architecture, mobile computing is a new paradigm that requires new thinking and methodologies that build on the existing knowledge and experience in computing and software engineering. Compared to desktop computers, mobile devices have many special features, such as motion sensors and GPS locators, and constraints, e.g., smaller devices with very limited resources and network connectivity. Therefore, innovative and more disciplined approaches must be applied in designing, developing and deploying software for mobile devices. Furthermore, mobile computing covers a wide range of software from embedded systems to consumer-centric, interactive apps.”<sup>10</sup> Businesses of all sizes will be challenged to prepare for the change in how people will access internet content by embracing the mobile Web.<sup>11</sup>

<sup>4</sup> New Media Consortium, The Horizon Project: 2010 Horizon Report; The Web Version, online at <http://wp.nmc.org/horizon2010/chapters/mobile-computing/>

<sup>5</sup> Martin, Sam, “Mobile Breathes New Life into Media,” Kress Report, August 10, 2010, online at <http://designmind.frogdesign.com/blog/mobile-breathes-new-life-into-media.html>

<sup>6</sup> GSMA, The European Mobile Manifesto, November 2009, online at [http://gsmworld.com/documents/gsm\\_2015\\_mobile\\_manifesto.pdf](http://gsmworld.com/documents/gsm_2015_mobile_manifesto.pdf)

<sup>7</sup> O’Connell, Michael, “New Developerworks Survey Shows Dominance of Cloud Computing and Mobile Application Development,” October 8, 2010, press release, online at <http://www.ibm.com/developerworks/aboutdw/2010survey-results/index.html>

<sup>8</sup> The World in 2009: ICT Facts and Figures, Presentation at ITU Telecom World, October 5-8, 2009, online at [http://www.itu.int/ITU-D/ict/material/Telecom09\\_flyer.pdf](http://www.itu.int/ITU-D/ict/material/Telecom09_flyer.pdf)

<sup>9</sup> dotMobi, “2010 Study of Mobile Web Trends Shows Continued Explosion of Mobile-Friendly Content,” October 20, 2010, online at <http://mtld.mobi/node/1857>

<sup>10</sup> Gerson Lehrman Group, “Software Engineering for Mobile Applications and Systems,” November 7, 2010, online at <http://www.glggroup.com/NewsWatchPrefs/Print.aspx?pid=51393>

<sup>11</sup> dotMobi, “2010 Study of Mobile Web Trends Shows Continued Explosion of Mobile-Friendly Content,” October 20, 2010, online at <http://mtld.mobi/node/1857>

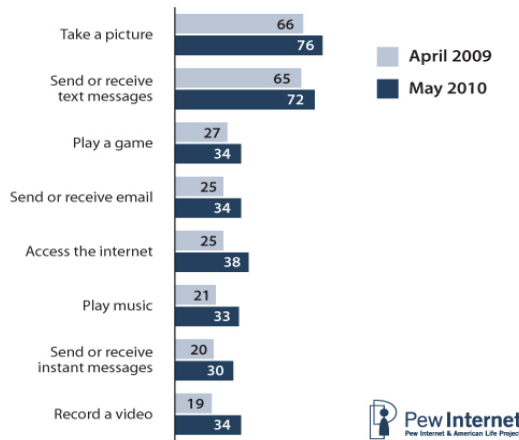
### Mobile Devices and Usage

Six in ten American adults are wireless internet users and mobile data applications are experiencing accelerating growth. Although there are many new devices available for accessing the mobile web, the Smartphone (a handheld computer integrated into a cell phone) is the primary access point in current use due to the large number of people who already own Smartphones or are switching from cell phones to Smartphones. Twenty-five percent of Americans now own Smartphones, up from 16% in 2009, and projected to exceed 50% by the end of 2011.<sup>12</sup> Additionally, cell phone users are taking advantage of a much wider range of their phones' capabilities. More than half of mobile web users go online from their phones on a daily basis.<sup>13</sup>

**Exhibit 1: Growth in Use of Non-Voice Data Applications  
April 2009 – May 2010**

**The use of non-voice data applications  
has grown significantly over the last year**

The % of cell phone owners who use their phones to do the following



Source: Pew Research Center's Internet & American Life Project, April 29-May 30, 2010 Tracking Survey. N=2,252 adults 18 and older; n=1,917 based on cell phone users.

It is estimated that by 2014 half of Americans' web browsing will be done on mobile devices. The acceleration of U.S. Smartphone ownership has led eMarketer to raise its estimate for the number of mobile media users by 2014 to 142.1 million, representing more than half of all U.S. mobile phone users and about 44 percent of the overall population.<sup>14</sup>

**Exhibit 2: U.S. Mobile Internet Users and Penetration, 2008-2014**

	2008	2009	2010	2011	2012	2013	2014
Mobile Internet Users (millions)	50.9	68.6	85.5	101.1	115.2	129.7	142.1
% of Mobile Phone Users	22.3%	28.7%	34.7%	40.3%	45.2%	50.1%	53.9%
% of Population	16.7%	22.3%	27.6%	32.3%	36.4%	40.6%	44.1%

Source: eMarketer, July 2010

<sup>12</sup> Carson, Jonathan, "The State of Apps: Fresh Insights From Neilson's Mobile App Playbook," September 2010, Presentation at AppNation Conference, online at <http://www.wipconnector.com/index.php/tip/117>

<sup>13</sup> Smith, Aaron, "Mobile Access 2010," Pew Internet and American Life Project, July 7, 2010, <http://www.pewinternet.org/Reports/2010/Mobile-Access-2010.aspx>

<sup>14</sup> -eMarketer Staff, "Smartphones Propel Mobile Net Use," August 25, 2010, online at [http://www.adweek.com/aw/content\\_display/news/digital/e3i56460287e21dd377aff2da7ccce79bc9](http://www.adweek.com/aw/content_display/news/digital/e3i56460287e21dd377aff2da7ccce79bc9)

Mobile devices are facilitating the growth of other popular online experiences, like social networking. Ninety-one percent of people on the mobile web use it to socialize compared to 79% of desktop users. Many people think the mobile phone is a better platform for social networking than the desktop computer. In fact, the rise of the use of mobile phones has corresponded directly with the rise in the popularity of Facebook.<sup>15</sup>

### The Mobile Ecosystem

Mobile software development occurs primarily in two forms: mobile websites and mobile applications. A mobile website is designed taking into consideration the special circumstances and requirements of the portable devices on which it will be viewed. Mobile applications are software programs that are loaded on to a user's mobile device and perform specific tasks. In general, applications run more quickly than access to mobile web sites, and the demand for both platforms has been high. Developers trained in more traditional software and internet technologies are finding they must become proficient in adaptation to mobile delivery in one or both of these forms. Any company having a website that cannot be viewed and used effectively on a mobile device risks losing sales and decreasing their customer satisfaction and loyalty. Customers are likely to bring their business to companies that offer more services through their mobile sites or applications.

On the mobile application side, there are operators, hand-held device vendors, platform companies and third party stores expecting developers to deliver applications (also known as "apps") that will be attractive to consumers. To date, much of the focus has been on Apple's App Store, Google's Android Market, Nokia's Ovi and RIM's BlackBerry App World. Industry analysts predict applications sales will undergo massive growth over the next three years, with estimates of mobile application revenues expanding from \$6.2 billion this year [2010] to nearly \$30 billion by 2013.<sup>16</sup>

On the mobile website development side, mobile websites have been called "the super app" by some industry analysts because of their enhanced power and platform-spanning capabilities.<sup>17</sup> The importance and uniqueness of the mobile environment is underscored by the development of the .mobi domain names. Created for web sites designed to be accessed by mobile devices, these top-level domain names have been available for registration by the public since 2006.

## Industry Overview

Mobile technologies and applications affect every business sector and industry, just like the creation of the internet affected all industries years ago. However, some industries employ more occupations that are directly impacted by the growth of mobile media. These industries are part of Information (NAICS 51) and Professional, Scientific and Technical Services (NAICS 54), both of which are considered service-providing industry sectors.<sup>18</sup> The NAICS codes selected for this report were chosen because of a higher than average concentration of workers whose jobs are affected by mobile media now and/or in the near future.

Please note that the data presented in Exhibit 3 provides a snapshot of the employment projections for industries related to mobile media, including firms that are not currently using mobile media but may become mobile media users in the future.

<sup>15</sup> McManus, Richard, "Top Ten Mobile Trends of 2010," April 21, 2010, online at [http://www.readwriteweb.com/archives/top\\_10\\_mobile\\_trends\\_of\\_2010\\_part\\_2\\_apps.php](http://www.readwriteweb.com/archives/top_10_mobile_trends_of_2010_part_2_apps.php)

<sup>16</sup> O'Connell, Michael, "New Developerworks Survey Shows Dominance of Cloud Computing and Mobile Application Development", October 8, 2010, press release, online at <http://www.ibm.com/developerworks/aboutdw/2010survey-results/index.html>

<sup>17</sup> Tsurulnik, Giselle, "U Tube Mobile Play Confirms HTML5 Threatens Apps," July 9, 2010, online at <http://www.mobilemarketer.com/cms/news/video/6765.html>

<sup>18</sup> Bureau of Labor Statistics, Industries at a Glance, "Information: NAICS 51", online at <http://www.bls.gov/iag/tgs/iag51.htm>

**Exhibit 3: Growth by Industry for Companies with a High Concentration of Workers in Mobile Media, in Los Angeles and Orange Counties, 2010-2015**

NAICS Code	Description	2010 Jobs	2015 Jobs	Job Growth	2010 # of Establishments
51121	Software Publishers	12,093	13,554	1,461	356
51821	Data Processing, Hosting, and Related Services	10,767	11,514	747	496
51913	Internet Publishing and Broadcasting and Web Search Portals	9,617	12,077	2,460	545
54143	Graphic Design Services	14,868	16,690	1,822	1,248
54151	Computer Systems Design and Related Services	73,451	83,916	10,465	6,625
54181	Advertising Agencies	19,278	21,864	2,586	1,161
<b>Total</b>		<b>140,074</b>	<b>159,615</b>	<b>19,541</b>	<b>10,432</b>

Source: EMSI Complete Employment – 4th Quarter 2010.

In the next five years, these industries are expected to grow and create jobs, some of which will be in mobile media. More research is needed to quantify mobile media jobs and job growth, because labor market information is not available for these occupations specifically. In addition to job creation in mobile media, it will be necessary to quantify the number of existing jobs that will require mobile media skills, and potentially training of incumbent workers.

### Implications of Mobile Media Across all Industries

IBM DeveloperWorks<sup>19</sup> provides support in mobile media to various industries including: aerospace and defense, automotive, computer services, consumer products, education, electronics, industrial products, insurance, life sciences, media and entertainment, professional services, retail, telecommunications travel and transportation. The fact is that companies in any industry can use mobile media to benefit their business. For example, banks offer apps for people to access their bank accounts, send payments, deposit checks. Restaurants have apps for customers to view their menus and place orders from their smart phones. Appendix C describes how mobile media is already affecting services in several industries, including communications, healthcare, banking, education, commerce and marketing.

### Challenges of an Emerging Technology

The distinctions between fixed, wireless, and mobile service will become blurred and may even disappear during the coming decade.<sup>20</sup> As the technology around mobile devices develops, several issues will affect how the technology is delivered and used and how the workforce is educated and trained.

### Mobile Websites vs. Apps and Multitude of Platforms

As noted earlier, mobile access development currently occurs on two platforms: mobile web sites and mobile applications or apps. The IT community expects one of these platforms to become dominant, and there is an active debate at this time about which platform that will be. Although many apps have been developed by individuals working from their homes, app development can be very expensive because the apps must be modified to work on so many different devices and platforms. On the other hand, with a website approach it is possible to reduce development costs by creating a single web site that can be

<sup>19</sup> IBM Developerworks website, online at <http://www.ibm.com/developerworks/industry/#myind>

<sup>20</sup> DeWaele, Rudy, "Understanding Mobile 2.0," December 11, 2006, online at [http://www.readwriteweb.com/archives/understanding\\_mobile\\_2.php](http://www.readwriteweb.com/archives/understanding_mobile_2.php)

used by a variety of mobile users and devices. A convenience to the user is that it is never necessary to download programs or install upgrades to use a mobile website, since those changes are made by the developer directly on the website.<sup>21</sup>

The multitude of platforms used for different mobile devices and the requirements of the different telecommunication networks poses a serious question for community colleges and other education and training institutions. In an e-mail survey regarding the best software programs to teach students today, Richard Herrera, Rich Media Developer at Toshiba wrote to Christy Campbell, Director of the North Orange County Community College District's Digital Media Center, "...Apple's iPhone platform uses Objective-C while Microsoft chooses to use Silverlight and HP will be using its newly acquired Palm OS. Adobe has its Flash platform and that's just the big guys. This means students and teachers will have to either choose a platform or try and learn them all."<sup>22</sup>

### ***Entrepreneurial Nature of Mobile Media***

A notable feature of mobile media development is the entrepreneurial nature of the emerging field. At one end are software engineers with advanced degrees and years of experience who are developing software, systems, and technical capabilities. At the other end are people in their home offices who are self-made computer pros, who are developing applications that can be sold or licensed to mobile media companies and vendors.

Much of early mobile development was done by individuals who designed apps and then sold them to Apple. From this foundation grew a proliferation of small, entrepreneurial companies dedicated to developing games and other content for mobile distribution. The rise of mobile app stores made it easier for individuals and small companies to enter the market and reach consumers globally. Some of these developers will only produce one marketable app but some of them go on to develop multiple, highly commercial applications.<sup>23</sup>

Companies such as Red Foundry, iSites, and Xyndi develop easy ways for "average users" to create mobile apps. Users can easily customize their apps without any programming knowledge, and can add content like music, videos, photos, blogs, maps, and more. These services also provide social networking integration so users can easily share apps with others.<sup>24</sup> In addition, several large companies like Apple or IBM offer development tools for creating mobile applications and websites. Apple provides resources for iOS development<sup>25</sup>.

All of these factors add to the complexity for the community colleges to respond to workforce development needs. Indeed, the mobile media workforce varies in education requirements (e.g. entrepreneur vs. mobile software engineer), skills requirements (competency in one or more platforms, programming skills etc.) and the number of workers involved in mobile media is still unknown. The Center of Excellence is in the process of conducting a multi-region employer survey to gather more data and make recommendations to community colleges. The survey results will be posted on our website in the fall of 2011.

<sup>21</sup> Holdsworth, Rich, "The Future of Mobile is in the Cloud," September 28, 2010, online at <http://www.mobilebusinessbriefing.com/apps/article/the-future-of-mobile-apps-is-in-the-cloud>

<sup>22</sup> Email correspondence shared during interview with Christie Campbell, email dated April 14, 2010, received from Richard Herrera, Rich Media Developer at Toshiba America.

<sup>23</sup> Hoogsteder, Vincent, "Keep an Eye on the Little Guy," October 20, 2010, Mobile Apps Briefing, online at <http://www.mobilebusinessbriefing.com/apps/article/keep-an-eye-on-the-little-guy>

<sup>24</sup> Hardawar, Devindra, "Red Foundry lands \$1.1 million to Let Anyone Make Apps Like a Pro," November 3, 2010, online at <http://venturebeat.com/2010/11/03/red-foundry-lands-1-1m-to-let-anyone-make-mobile-apps-like-pros/>

<sup>25</sup> Resources can be accessed at <http://developer.apple.com/devcenter/ios>. Some programming courses are also available online.

## Occupational Overview

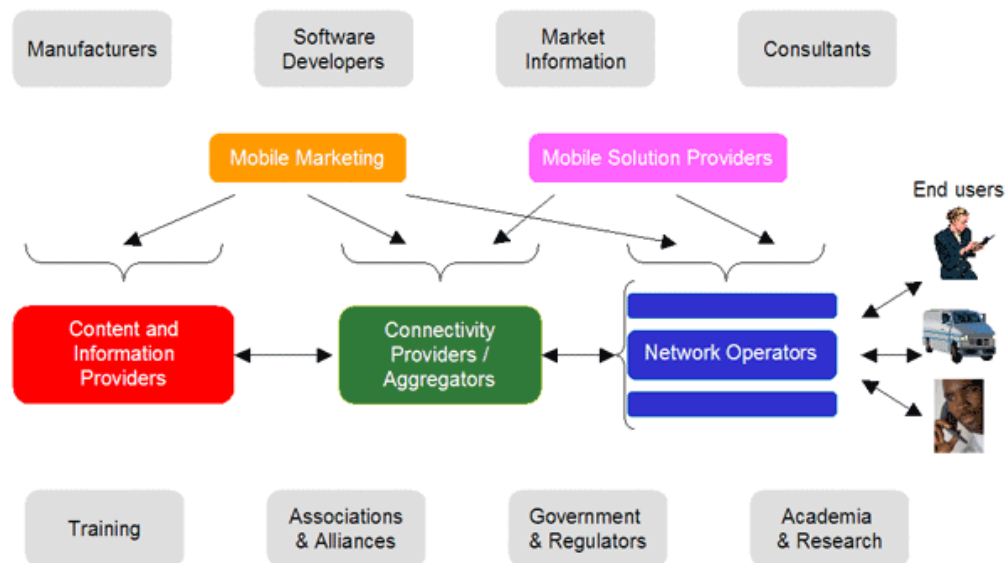
The rapid proliferation of mobile media technology is creating new skill sets in many IT occupations along with new departments, programs, and companies to serve the expanding demand for mobile devices and applications. The attraction of mobile computing is so strong, in fact, that the Bureau of Labor Statistics predicts, "As these devices become a larger part of the business environment, it will be necessary to integrate current computer systems with this new, more mobile technology."<sup>26</sup> Already, some longtime desktop application developers have shifted entirely to mobile applications development and new companies and developers have formed around specific platforms.<sup>27</sup>

Mobile media jobs (and careers) occur at every step in the mobile media development process:

- **CONTENT:** Content owners, ranging from multinational entertainment conglomerates to individual artists
- **DESIGN:** Designers and developers, who prepare content for mobile distribution and use
- **PUBLISH:** Publishers and aggregators, who assemble, test, and promote mobile content
- **DISTRIBUTE:** Provisioning and hosting providers, who provide the actual physical means for content distribution
- **MARKET AND DELIVER:** Marketing and delivery agents, which includes the mobile operators, as well as others who sell mobile content to end users<sup>28</sup>

The variety and complexity of jobs and employers also can be seen in Exhibit 4.

**Exhibit 4 – Mobile Value Chain**



**The Mobile Data Value Chain**  
Mobile Data Association

Source: Mobile Data Association<sup>29</sup>

<sup>26</sup> Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2010-11 Edition, Computer Software Engineers and Computer Programmers, on the Internet at <http://www.bls.gov/oco/ocos303.htm>

<sup>27</sup> Holdsworth, Rich, "The Future of Mobile is in the Cloud," September 28, 2010, online at <http://www.mobilebusinessbriefing.com/apps/article/the-future-of-mobile-apps-is-in-the-cloud>

<sup>28</sup> Strategy Analytics, Inc., "Understanding the Mobile Ecosystem, A White Paper Prepared for Adobe Systems Incorporated," Newton, MA, 2008, online at [http://mmi.sbccc.edu/images/pdf/Mobile\\_ecosystem.pdf](http://mmi.sbccc.edu/images/pdf/Mobile_ecosystem.pdf)

<sup>29</sup> Mobile Data Association web site, The Mobile Value Chain, online at <http://www.themda.org/the-mobile-value-chain.php>

## Occupations and Forecast

Many of the workers in mobile media were trained for traditional IT careers in web development and programming. They are the pioneers of mobile web site and application development, transposing their skills to the new environment and developing new skills sets along the way. Some workers are self-taught entrepreneurs who grew up using computers and pushed the mobile ecosystem with their ideas, experiments and discoveries. Quite a few workers were first interested in the popular uses of mobile media for social media and/or gaming, and from those foundations they began to develop other uses of mobile media. The workforce landscape of mobile media can be categorized into two types of impacted occupational groups: new/emerging careers specific to mobile media and traditional occupations with changing skills and knowledge due to mobile media.

### ***New Job Titles and Descriptions***

Because of the proliferation of mobile media technologies, new occupational titles and job descriptions that have not yet been recognized by the Bureau of Labor Statistics are emerging. A sampling of these includes: App Developer (for iOS, Android, WebOS, etc.), Mobile Web Developer, Field App Engineer, Lead Mobile Engineer, Mobile Multimedia Software Developer, Mobile Web Graphics Software Manager, Mobile Solutions Developer, Mobile Software Architect, Interactive Designer, Mobile Product Manager, Programmer, Coder and many more. A review of online job postings<sup>30</sup> in mobile media suggested that the most common terms used by employers are App Developers, Web Developers, Programmers and Engineers.

These new jobs created by the emergence of mobile media require new skills. For instance, mobile designers and mobile software engineers need skills and expertise beyond traditional graphic design and programming. These are described in Appendix B.

The job announcements for these new types of jobs require specific technical skills and mastery of specific platforms, programming languages, and/or software. However, they rarely require a college degree. It seems that companies that create new jobs specific to mobile media are looking for talent and ability to do this highly specialized work, but do not require applicants to have formal education.

### ***Traditional Jobs***

It is common for companies to add mobile media to the responsibilities of their existing IT employees. In these situations, employees who develop mobile media keep their job titles but have to learn new skills to implement the new projects. For example, at Lynda.com, Web Developers are Project Managers and their teams include Programmers, Interface Designers, and other staff at a variety of levels of expertise.<sup>31</sup> As second example, Smith Micro Software, Inc.<sup>32</sup> is currently recruiting for several traditional positions with added responsibilities in mobile media. They include Video Engineers, Senior Web Developer, Director of Engineering – Mobile, Senior Software Engineer, and Senior Product Manager – Mobile Broadband Device Management.

Many established occupations are being significantly affected by mobile media. A number of these occupations have been chosen for review here, based on the job duties and on Bureau of Labor Statistics predictions that the demand for workers in these jobs will be affected by mobile media. The following excerpts from the Bureau of Labor Statistics Occupational Outlook Handbook (2010-11 Edition)<sup>33</sup> indicate the primary duties of each occupation and, where appropriate, the Bureau's prediction of the impact of mobile media.

<sup>30</sup> Review of approximately 30 job postings on websites such as [www.monster.com](http://www.monster.com).

<sup>31</sup> Phone interview with Laurie Burruss, Director of Digital Media, Pasadena City College, currently on leave to serve as Education Director at [www.lynda.com](http://www.lynda.com).

<sup>32</sup> <http://www.smithmicro.com/>

<sup>33</sup> Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2010-11 Edition, <http://www.bls.gov/oco/ocos305.htm> and <http://www.bls.gov/oco/ocos303.htm>

**Web Developers** (included in 15-1099) are responsible for the technical aspects of web site creation. Using software languages and tools, they create applications for the web. They oversee production and implementation of web sites. As the number of services provided over the Internet expands, Web administrators and developers will continue to see employment increases.

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**Webmasters or Web administrators** (included in 15-1099) are responsible for maintaining websites. They oversee issues such as availability to users and speed of access, and are responsible for approving the content of the site. Webmasters also collect and analyze data on Web activity, traffic patterns, and other metrics, as well as monitor and respond to user feedback.

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**Computer Programmers** (15-1021) write programs. After computer software engineers and systems analysts design software programs, the programmer converts that design into a logical series of instructions that the computer can follow. Computer programmers also update, repair, modify, and expand existing programs.

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**Computer Software Engineers** (15-1031 for Applications and 15-1032 for Systems) apply the theories and principles of computer science and mathematical analysis to create, test, and evaluate the software applications and systems that make computers work. Software engineers design and develop many types of software, including computer games, business applications, operating systems, network control systems, and middleware. They must be experts in the theory of computing systems, the structure of software, and the nature and limitations of hardware to ensure that the underlying systems will work properly. New growth areas will also continue to arise from rapidly evolving technologies. The increasing uses of the Internet, the proliferation of Web sites, and mobile technology such as the wireless Internet have created a demand for a wide variety of new products. As more software is offered over the Internet, and as businesses demand customized software to meet their specific needs, applications and systems software engineers will be needed in greater numbers. In addition, the growing use of handheld computers will create demand for new mobile applications and software systems. As these devices become a larger part of the business environment, it will be necessary to integrate current computer systems with this new, more mobile technology.

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**Computer Support Specialists** (15-1041) respond to inquiries from their organizations' computer users and may run automatic diagnostics programs to resolve problems. In addition, they may write training manuals and train computer users in the use of new computer hardware and software. As technology becomes more complex and widespread, support specialists will be needed in greater numbers to resolve the technical problems that arise.

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**Multimedia artists and animators** (27-1014) work primarily in motion picture and video industries, advertising, and computer systems design services. They draw by hand and use computers to create the series of pictures that form the animated images or special effects seen in movies, television programs, and computer games. Demand for multimedia artists and animators will increase as consumers continue to demand more realistic video games, movie and television special effects, and 3D animated movies. *Additional job openings will arise from an increasing need for computer graphics in the growing number of mobile technologies.*

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**Graphic Designers** (27-1024) plan, analyze, and create visual solutions to communications problems. They find the most effective way to get messages across in print and electronic media using color, type, illustration, photography, animation, and various print and layout techniques. Graphic designers also develop material for Internet Web pages, interactive media, and multimedia projects. Graphic designers use specialized computer software packages to help them create layouts and design elements. *Graphic designers with Web site design and animation experience will especially be needed as demand increases for design projects for interactive media – Web sites, mobile phones, and other technology.*

**Employment and Wages**

Exhibit 5 presents projected growth rates and wages for the traditional jobs identified as particularly affected by mobile media.

**Exhibit 5: Growth in Demand for Selected Occupations  
in Los Angeles and Orange Counties, 2010-2015**

SOC Code	Description	2010 Jobs	2015 Jobs	Change	% Change	New & Repl. Jobs	Annual Openings	2010 Avg. Hourly Wage
15-1021	Computer programmers	14,023	13,924	-99	-1%	1,359	272	\$34.91
15-1031	Computer software engineers, applications	21,126	23,431	2,305	11%	3,194	639	\$42.26
15-1032	Computer software engineers, systems software	21,326	23,338	2,012	9%	2,909	582	\$46.29
15-1041	Computer support specialists	22,672	23,672	1,000	4%	4,138	828	\$23.86
15-1099	Computer specialists, others*	10,504	10,978	474	5%	1,618	324	\$35.71
27-1014	Multi-media artists and animators	17,234	19,135	1,901	11%	3,831	766	\$23.17
27-1024	Graphic designers	25,819	28,296	2,477	10%	6,443	1,289	\$25.86
	<b>Total</b>	<b>132,705</b>	<b>142,775</b>	<b>10,070</b>	<b>8%</b>	<b>23,492</b>	<b>4,698</b>	

Source: EMSI Complete Employment – 4th Quarter 2010. \* Includes web developers and web administrators

According to the projections, all occupations but one are expected to grow in absolute numbers, in Los Angeles and Orange Counties. If we take replacement jobs (due to turn-over or retirements) into account, all occupations are expected to grow, and the region is expected to have 4,698 job openings over the five year period. The wages for these traditional occupations are high, although they do not reflect the additional pay earned by employees skilled in mobile media. With the expected growth in traditional IT occupations and the emerging need for mobile media workers, students in mobile media would be expected to have exciting job opportunities in the region.

**Employer Needs and Challenges**

For the preparation of this initial report on mobile media, the Center of Excellence interviewed ten businesses in LA/OC to hear about their workforce needs. Five businesses were mobile media companies and five were in various industries, and used mobile media as an important part of their operations. Mobile media workers can be employed in three types of companies:

- Companies having mobile media as their core business
- Companies (in any industry) using mobile media as part of their business operations
- Entrepreneurs and start-ups

**Mobile media companies** are generally IT companies that create software and other IT solutions; marketing firms that specialize in mobile media and social media; or companies specialized in gaming and entertainment. For example, Textopoly is a full service mobile marketing and advertising agency. SproutStart is a strategic online marketing firm. Both create mobile sites and apps for their clients, among many other services. They bring the expertise that most companies do not have, to successfully enter the world of mobile media. Mobile media companies generally employ app developers, app designers, web developers, programmers and engineers, to work on mobile media projects. They have “mobile media” positions within their companies and anticipate job growth for these occupations.

**Other industries:** At present, companies that use mobile media but have a different core business (e.g. banking, retail, food services etc.) rarely have positions that are entirely focused on mobile media. They generally employ web developers, software developers, software architects, software engineers, programmers and engineers, and add mobile media to their responsibilities and projects. As an example, Toshiba has a mobile website that was created by their existing web design team. Employees learned on the job. Reazon Systems, inc. is a forward-thinking software development company specialized in turning complex educational and business processes into robust and user-friendly experiences. Their software developers are learning skills required for mobile media. However, as more companies develop their use of mobile media, some new positions are expected to be created. For example, Kelly Blue Book did not have mobile media positions up to 6 months ago, although the company has a mobile website and applications for all major platforms. Their engineers and software developers were in charge of mobile. Now the company has a product director for mobile media and is hiring engineers to specifically focus on mobile.

**Entrepreneurs and start-ups** typically have a very small number of employees, at least during their first few years in business. Individuals with the right skill and a business idea can create their own business, work as consultants for companies that do not have expertise in mobile media, or create mobile sites, create apps and sell them or keep them to earn money on each download. For example, Miso Media developed an app for iPads and iPhones called Miso Music. It teaches people how to play six musical instruments, using real time note recognition. The company was created three years ago and obtained \$600,000 seed funding from Google ventures and other investors. JustEnjoy is a real-time marketing solution that combines mobile messaging, social media and self-serve technologies to deepen the engagement between restaurants and customers. Charles Du from Apple shared the story of a student who created an outstanding app for Stanford and sold it for \$3.5 million. Mobile media offers excellent opportunities for entrepreneurs to create new businesses with significant earning potential.

## Employers Input

### **Worker Shortage**

When asked how difficult it is to find people qualified to work in mobile media, all employers but one responded “very difficult”. Mobile media companies reported having great difficulty finding qualified employees because few people have the technical skills and soft skills that are required in mobile media. For instance, app developers with expertise in different platforms (iOS for Apple, Android, Nokia, Blackberry etc.) are scarce. Charles Du, from Apple, stated that businesses are looking for app developers but there are not enough available. As a result, according to Charles, iOS developers earn between \$100 and \$150 per hour because of the high demand and low supply.

### **Job Requirements**

Job applicant must have the technical skills required for each job, and that may include the knowledge of several platforms such as iOS for Apple, Android, Nokia, Blackberry etc. as well as programming languages, new codes, and for some jobs, certifications as well. Skills requirements may include interface design, Java, Python, Objective-C, C++, database management, web development, WordPress, PHP and/or many more.

To be successful in mobile media, employees must enjoy learning new things because the technology changes rapidly. They have to be creative, logical, good problem solvers with initiative. Naushad Huda from Textopoly stated that creating a mobile website is very different from creating a regular website. It is very important to choose carefully what will be displayed on the small screen, what the graphic design will look like, how to minimize the number of clicks for users to get to the page they want, and so on. The creative side is extremely important, in addition to the technology behind a mobile site or app. Employers also look for employees with good interpersonal skills, motivation and dedication, and who work well as part of a team.

### **Training and Education**

The majority of *mobile media employers* interviewed for this report did not require degrees when hiring new employees, but evaluated technical skills, portfolios, and personalities in comparison to their organizational culture. Interestingly, several employers stated that their best team members were college drop outs. One employer added that he prefers to hire people with experience and no college degree than people with Masters Degrees who have theoretical knowledge but no applied knowledge. In mobile media companies, employees have to be proficient in mobile media, and a college degree is not directly relevant to what employers seek most.

In *non-mobile media companies*, the opposite seems to prevail when new employees are hired as IT professionals and also given the responsibility of creating mobile media. Several employers stated that it is difficult to find highly qualified programmers or engineers, and asking them to have experience in mobile media would make it even more challenging to find qualified candidates. Mobile media is too new to expect job applicants in IT to be knowledgeable, so these companies look for candidates who fit their traditional job requirements and have a strong interest in learning mobile media, strong technical skills, and strong problem solving skills, with the intention of having them learn mobile media on the job.

IT employees generally learn mobile media on their own, on the job, by using platforms' online resources, blogs and other online support. Learning mobile media is seen as obtaining new skills necessary to adapt to the new technologies and business practices. These employees generally have college degrees, because they are hired using the same criteria as other engineering and IT positions. However, five employers explained that in IT and in mobile media in particular, the technology changes too rapidly for a degree to attest to a person's skills. Lifelong learning is critical.

### **Employers' Recommendations to Community Colleges**

#### **Role of the Community Colleges**

There are no courses in mobile media at community colleges or universities in Los Angeles and Orange Counties. Employers agreed that not enough people are learning to create apps on their own, and college courses would be a good way to create a pipeline and support people's efforts in learning mobile media. Mobile media is not a fad; it is a new technology that is increasingly being used across industries, and colleges cannot ignore the implications on education and training. However, teaching mobile media presents significant challenges such as keeping the courses up to date and finding faculty members who know the latest trends and developments. Also, more research is needed to quantify the number of mobile media jobs and further define workforce development needs before colleges can adequately respond.

#### **Courses and Programs**

All employers interviewed in this preliminary study strongly encouraged the community colleges to teach mobile media. One employer recommended using Santa Barbara City College's certificate program as a model (described in the "Model Programs" section of this report). Four others stated that a Certificate would be more valuable than stand-alone courses.

Recommendations regarding creating courses in app development and mobile web development, and teaching technical skills included: offering classes in software development kits for the different platforms; Python; Java; interface design (to learn tree structures and flow charts to minimize the number of clicks); programming, coding, design, html, browser OS, form interaction, java script, animation, graphic/web design, CSS, PHP etc. One employer mentioned that curriculum is outdated in most schools, and CIS programs teach dated software. According to him, colleges should teach online software, such as API, to prepare the students to use programs that businesses use today.

Companies involved in mobile marketing recommended that colleges add courses on mobile media to marketing and advertizing programs. Marketing students need to learn how to market products and services using mobile media and how to use and manage social media.

### Internships and Partnerships

Most employers emphasized the importance of internships. For instance, SproutStart stated that the key to becoming proficient at mobile media is internships. Knowing how to do the work is more important than theoretical knowledge. At this company, new hires need to do a few web development projects first, and that can be intimidating for college students. An internship would give them the opportunity to gain experience, confidence and show what they can offer to the company. Textopoly worked with interns to create mobile sites for two local community colleges. Students received credits from their college, in addition to getting practical experience in mobile media. Colleges need to establish more partnerships with businesses and more internship opportunities for students.

Colleges can partner with Apple to offer courses on iOS. According to Charles Du, 1,800 universities worldwide have already joined the iOS Developer University Program. Colleges need to help create the workforce to enter the world of mobile media because it is only going to continue to grow and there is a severe shortage of people who can create apps. Golden West College is now part of the iOS Developer University Program, but it is the only one in the LA/OC region.

## Community Support and Resources

Although tools and standards information are available to the design and development community at large, individual designers often keep up with the latest updates through developer lists and proactive education. Much like those developers who first called for web standards, there are currently virtual communities of mobile developers working on the various tweaks and solutions to cross-platform authoring issues. Even sites like W3C<sup>34</sup> may not be as up-to-date as the numerous lists, blogs, and forums, which are a significant resource to the mobile media development community.<sup>35</sup>

**Exhibit 6: Resources Available to the Mobile Media Development Community**

Business, Community or Online Resource	Useful Features	Type of Organization
<b>Institute for Electrical and Electronics Engineering (IEEE) Computer Society,</b> <a href="http://www.computer.org/portal/web/guest/home">http://www.computer.org/portal/web/guest/home</a>	Conferences; Certification for software professionals Training Courses Local Chapters	Professional Membership Association
<b>The Mobile Data Association (MDA)</b> - Not-for-profit industry association dedicated to represent and promote all mobile data centric businesses (Europe), <a href="http://www.themda.org">www.themda.org</a>	Events Blogs Reports Represents Mobile Data Community	Non-Profit Professional Organization
<b>CTIA</b> - International Association for the wireless Telecommunications Industry, <a href="http://ctia.org/">http://ctia.org/</a>	Conferences News Events Advocacy	Industry Membership Association
<b>Wholesale Applications Community (WAC)</b> - Works to increase the overall market for mobile applications by encouraging open standardized technologies, <a href="http://www.wacapps.net/web/jil/home">http://www.wacapps.net/web/jil/home</a>	Developer Sites Forums Advocacy	Professional Membership and Advocacy Group
<b>Mobile Media Institute</b> , Santa Barbara City College, <a href="http://www.mobilemediainstitute.org/">http://www.mobilemediainstitute.org/</a>	Program Descriptions Articles/current news Glossary	College Program Site
<b>Global System for Mobile Communications Association (GSMA)</b> - Represents the interests of the worldwide mobile communications industry, <a href="http://www.gsmworld.com/index.htm">http://www.gsmworld.com/index.htm</a>	Global Industry Events Advocacy Projects to stimulate innovation Awards	International Industry Membership Association

<sup>34</sup> World Wide Web Consortium at <http://www.w3.org/>

<sup>35</sup> Gotomobile, "Mobile Designer," online at <http://www.gotomobile.com/archives/the-mobile-designer>

Business, Community or Online Resource	Useful Features	Type of Organization
<b>Mobile Marketing Association (MMA)</b> - Global non-profit trade association representing all players in the mobile marketing value chain, <a href="https://mmaglobal.com/main">https://mmaglobal.com/main</a>	Research Trends Certification Events	Non-Profit Trade Association
<b>Mobile Entertainment Forum (MEF)</b> - Represents companies throughout the entire mobile entertainment value chain, <a href="http://www.m-e-f.org">http://www.m-e-f.org</a>	Advocacy Policy & Regulatory Updates Reports Events and meetings	Non-Profit Trade Association
<b>Center for Digital Education (CDE)</b> - National research and advisory institute specializing in education technology trends, policy and funding, <a href="http://www.centerdigitaled.com/">http://www.centerdigitaled.com/</a>	Surveys Market Research and Reports Converge Media News	Research and Advisory Institute
<b>National Workforce Center for Emerging Technologies (NWCET)</b> - See: Media Communication and Technology Curriculum, <a href="http://www.nwcet.org/products/mediaComm.asp">http://www.nwcet.org/products/mediaComm.asp</a>	Skill Standards Research Videos Curriculum	NSF Advanced Technology Education Center
<b>The New Media Consortium (NMC)</b> - Learning-focused organizations dedicated to the exploration and use of new media and new technologies, <a href="http://www.nmc.org/about">http://www.nmc.org/about</a>	Projects Initiatives Publications	International not-for-profit membership consortium
<b>Mobile Commerce Daily</b> , <a href="http://www.mobilecommercedaily.com/">http://www.mobilecommercedaily.com/</a>	Guides Webinars	Mobile Retail News Service
<b>Mobihealthnews</b> - Chronicles the healthcare sector's adoption of mobile technology, <a href="http://mobihealthnews.com/">http://mobihealthnews.com/</a>	Healthcare News Research	Mobile News Service Focused on Healthcare

## College Response and Issues

### *Existing Programs in Los Angeles and Orange Counties*

Currently, the region does not have established programs in mobile media. However, Golden West College recently became an Apple Authorized Training Center for Digital Media, and now participates in the iOS Developer University Program. New courses to create apps using iOS are starting at Golden West in the spring of 2011.

From our research, Golden West is the only college with mobile media courses at present. Nonetheless, many other colleges have computer and information systems programs that could consider adding some courses in mobile media. These programs fall under the following TOP codes:

0614.00 Digital Media	0702.10 Software Applications
0614.10 Multimedia	0707.00 Computer Software Development
0614.30 Website Design and Development	0707.10 Computer Programming
0614.50 Desktop Publishing	0708.10 Computer Networking
0614.60 Computer Graphics and Digital Imagery	0709.00 World Wide Web Administration
0702.00 Computer Information Systems	0709.10 E-Commerce (technology emphasis)

The courses and programs from these TOP Codes available in the community colleges in Los Angeles and Orange Counties are shown in Exhibit 7, revealing the widespread availability of related classes for community college students.

**Exhibit 7: TOP Codes of Interest to Mobile Media Students in Los Angeles and Orange County Community Colleges**  
**(C= Certificate Programs/ AA= AA or AS Degree)**

	614.00	614.10	614.30	614.50	614.60	0702.10	707.00	707.10	708.10	709.00	709.10
Cerritos College						C, AA		C, AA			
Citrus College					C, AA						
Coastline College		C	C	C	C	C, AA		C, AA	C, AA	C	
Cypress College				C	C	C, AA					
East Los Angeles College		C, AA		C, AA				C			
El Camino College			C					C			
Fullerton College				C	C	C					
Glendale College				C						C, AA	
Golden West College							C, AA				
Irvine Valley College			C, AA	C, AA	C, AA	C, AA		C, AA	C, AA		
Long Beach City College				C, AA	AA			C, AA	C, AA		
Los Angeles City College		C				C		C	C, AA		
Los Angeles Harbor College						C					
Los Angeles Mission College		C, AA				C		C			
Los Angeles Pierce College								C, AA	C		
Los Angeles Southwest College						AA		AA			
Los Angeles Valley College						C		C, AA			
Mt. San Antonio College			C	C, AA	C, AA	C		C, AA	C, AA		
Orange Coast College		C, AA					C, AA	C, AA			
Pasadena City College		C, AA				C, AA		C, AA			
Saddleback College			AA		C, AA	C, AA	C, AA		C, AA	C, AA	C, AA
Santa Ana College	C		C, AA	C, AA	C, AA						
Santa Monica City College		C, AA						C, AA			
West Los Angeles College									C, AA	C, AA	

Source: California Community College Chancellor's Office List of Approved Programs \* 0702.00 Computer Information Systems is offered at every college.

The Los Angeles County and Orange County community colleges offer a wide array of courses appropriate for people interested in mobile media, with a few notable exceptions. There are very few certificate and/or degree programs in Digital Media (614.00) and E-commerce (0709.10). Both of these appear to be highly relevant to mobile media careers.

Most of the community colleges in the area focus their IT course offerings in a few of the TOP Code categories. Several colleges (like Coastline, Irvine Valley, Mt. San Antonio, and Saddleback) have offerings in many (six or more) of the categories. The rest of the colleges have more limited offerings focused in a few categories.

### Educational Preparation Required for IT Positions

For mobile media jobs, employers' input revealed that traditional education is not always required, as most employers seek people with a specific set of skills, with or without a degree. Job applicants who have the technical skills to create mobile websites and/or create apps on multiple platforms are in high demand.

Traditional IT jobs often require a bachelor's degree; however, the Department of Labor Bureau of Labor Statistics notes that often candidates with less education are able to get entry-level positions.

For **Webmasters**, an associate degree or certification is sufficient although more advanced positions might require a computer-related bachelor's degree.<sup>36</sup> **Web developer** positions generally need a bachelor's degree in a computer-related field, but for some positions, related experience and certification may be adequate.

Many **programmers** require a bachelor's degree, but a 2-year degree or certificate may be adequate for some positions. Some computer programmers hold a college degree in computer science, mathematics, or information systems, whereas others have taken special courses in computer programming to supplement their degree in a field such as accounting, finance, or another area of business.<sup>37</sup>

A college degree is required for some **computer support specialist** positions, but an associate degree or certification may be sufficient for others. Strong problem-solving and communication skills are essential.<sup>38</sup>

Associate degrees and certificates in **graphic design** also are available from 2-year and 3-year professional schools, and graduates of these programs normally qualify as assistants to graphic designers or for positions requiring technical skills only. Creative individuals who wish to pursue a career in graphic design—and who already possess a bachelor's degree in another field—can complete a 2-year or 3-year program in graphic design to learn the technical requirements.<sup>39</sup>

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<sup>36</sup> Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2010-11 Edition, Computer Network, Systems, and Database Administrators, on the Internet at <http://www.bls.gov/oco/ocos305.htm>

<sup>37</sup> Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2010-11 Edition, Computer Software Engineers and Computer Programmers, on the Internet at <http://www.bls.gov/oco/ocos303.htm>

<sup>38</sup> Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2010-11 Edition, Computer Support Specialists, on the Internet at <http://www.bls.gov/oco/ocos306.htm>

<sup>39</sup> Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2010-11 Edition, Graphic Designers, on the Internet at <http://www.bls.gov/oco/ocos090.htm>

## Model Programs

At this time, very few community colleges in California offer courses and/or certificates specifically for Mobile Media. Santa Barbara City College and Cerro Coso have the following programs:

### **Santa Barbara City College Mobile Media Institute**

Santa Barbara City College's School of Media Arts received a grant a few years ago to create a Mobile Media Institute. The grant ended but the Institute continues. It focuses on curricula encompassing the creation, production, organization, and distribution of micro-content including news, video, music, games, and supplemental educational materials specifically designed for personal electronic devices. Their three skills competency awards may serve as models for other colleges interested in creating mobile media courses.

#### **Exhibit 8: Santa Barbara City College Mobile Media Institute Skills Certificates**

##### Skills competency Award in Mobile Applications Developer

HTML, Web Technologies and Web mastering  
 Java Programming  
 C# Programming  
 Java Wireless Device Programming  
 Microsoft Mobile Device  
 Flash Programming  
 J2EE Server Programming or ASP.net Using C# or Web Server Programming

##### Skills Competency Award in Mobile Media Design and Development

Wireless and Media  
 Case Studies in Mobile Media  
 Online & Mobile Advertising  
 Web Design for Mobile Devices  
 Flash 1  
 Flash Programming  
 Video Game Design  
 Video Game Programming  
 Mobile Content Development and Distribution

##### Skills Competency Award in Mobile Device Administration

Introduction to Operating Systems  
 MS Windows Server Administration  
 MS Exchange Server Administration  
 Blackberry Enterprise Server System Administration

Source: SBCC Mobile Media Institute Website<sup>40</sup>

### **Cerro Coso Community College Mobile Media Certificate**

The Cerro Coso Community College Mobile Media Certificate program is geared specifically to the student interested in design and development of content and media for mobile devices, such as cell phones, mp3 players, and tablets. Design and usability considerations for small screens are emphasized. In addition to technical skills and competencies, students are introduced to the opportunities and challenges of working in an emerging industry. Students are required to complete all of the core courses and all courses in the option that they choose.

<sup>40</sup> Santa Barbara City College Mobile Media Institute Web Site online at <http://www.mobilemediainstitute.org/>

**Exhibit 9: Cerro Coso Community College Mobile Media Certificate Program**

<b>Mobile Media Core Courses (complete all of the following)</b>	<b>Units</b>
Digital Imaging with Photoshop	3.0
XHTML/CSS	3.0
Introduction to Mobile Media	1.5
Web Scripting with Javascript	3.0
E-Commerce	3.0
<b>Mobile Web Option</b>	<b>Units</b>
Design and Development for Mobile Devices	3.0
Web Development w/PHP & MySQL	3.0
Advanced Mobile Web Development	1.5
<b>Mobile Broadcasting Option</b>	<b>Units</b>
Introduction to Podcasting	1.5
Digital Video Production	3.0
Broadcast Media for Mobile Devices	3.0

**Mobile Development Bachelor of Science Degree**

Though located in Florida and operating under a different accreditation standard than the California community colleges, Full Sail's Mobile Development Bachelor of Science Degree 32-month online program provides an interesting approach to mobile media education. The program emphasizes programming and design fundamentals geared toward different mobile platforms. The wide range of classes shown in Appendix D indicates the depth and breadth of skills required of the mobile media professional.

Early courses in the Full Sail BS program focus on design principles that cater to the strengths of different devices, and teach the importance of creating an intuitive user experience. Then the students move to standard programming languages, including JavaScript, PHP, and XHTML, as well as specialized development kits for popular mobile platforms like iOS and Android. The curriculum also covers the business side of mobile development. Students learn how to conduct market research, as well as distribute and promote their own applications. "This combination of design, programming, and distribution gives graduates of the program a well-rounded portfolio, and the skill set to work with a software development team at a corporation or even create their own startup application company."<sup>41</sup>

<sup>41</sup> Full Sail University website, Description of Mobile Development BS Degree, online at <http://online.fullsail.edu/degrees/mobile-development-bachelors>

## Conclusion and Recommendations

Because labor market information and forecast do not exist for mobile media jobs, more research is needed to evaluate the size of the need before colleges create new programs. Following-up on this report, the Center of Excellence is conducting a large employer survey to assess employer needs and workforce development needs. The results will be presented in a second report that will be posted at [www.coeccc.net](http://www.coeccc.net) in the fall of 2011.

### Infusing Mobile Media into Existing Courses and Certificates

Because it is clear that mobile media is affecting many traditional occupations (e.g. programmers and website developers), and creating some new jobs (e.g. app developers), community colleges should examine existing curricula for ways to infuse mobile media skills and knowledge into current college offerings in IT. Anyone learning website development should also learn mobile website development. Students majoring in marketing need to learn how to market products using mobile media and social media. These changes are important to keep existing programs up-to-date.

Employers interviewed for this report suggested that there is a need for community college programs in mobile media. Further research with a much larger sample will indicate how many programs are in fact needed in the LA/OC region. When that is known, colleges may consider a staged approach in which existing courses are updated and then, certificate and degree programs may be modified to reflect inclusion of mobile media. Another option is to group existing courses into new configurations, starting with certificate programs and progressing later to degree options, labeled as mobile media development programs. These programs could also include some new offerings specifically geared to mobile media. The Santa Barbara and Cerro Coso Community College models offer a logical way to implement this type of approach.

### Marketing the Mobile Media Aspect of IT

Some colleges have experienced decreasing enrollments in IT classes and programs over the past five years. By emphasizing the usefulness of existing offerings to the student interested in mobile media, a new set of students may be attracted to the IT area. In partnership with college business education departments, IT programs may want to add Entrepreneurship and/or Small Business courses as electives or requirements, thus preparing students to be self-employed or create a start-up business. In some cases, just updating the catalog and/or marketing materials to reflect the college's involvement in mobile media, may be enough to help potential students understand that traditional IT courses are still relevant and useful to enter careers in IT and in mobile media.

### Lifelong Learning

Emerging technologies bring the need for quality professional development for the existing workforce. Community colleges are well-positioned to offer skill upgrades through regular courses, contract education, and community education.

Concurrently, community college instructors will need support for their own professional development to stay current with mobile media developments. Vendor certifications are one way of keeping up with changes in the field and colleges should support the efforts of IT faculty to obtain these certifications.

### Partnerships

In mobile media, partnerships with vendors as well as employers will be essential to the community colleges' success. The new partnership between Golden West College and Apple is a good example of the type of collaboration that benefits both faculty and students. Colleges are encouraged to partner with mobile media companies to give an opportunity to the students to work on real mobile media projects. Again, the most desirable job applicants are those who have programming skills, app

development skills, creativity and logic, rather than degrees with limited or no experience. Internships and class projects are very important for students to gain practical experience in mobile media.

### **New Education Models**

Research indicated that the mobile media development process is generally a team-based effort and new developments are being made in the field almost on a daily basis. To prepare students to work in mobile media, classes need to emphasize team projects. Internships and apprenticeships will be especially important since many mobile media employers are looking for people who have a strong combination of educational and experiential backgrounds. Hands-on projects, already the hallmark of good IT education, will become even more important. Students should be encouraged to take their class projects into the real world whenever possible.

### **Advisory Committees: Real or Virtual?**

The traditional advisory committee format, driven in part by state regulations for yearly meetings, may not serve the IT/mobile media area as well as other occupational and vocational areas for which it was originally designed. Perhaps without completely abandoning traditional advisory committees, newer formats can be added in to provide input in new areas like mobile media. Advisors could be asked to participate in blogs or online forums to discuss important questions and issues. Brief email or online surveys could be conducted frequently as new areas of concern or interest are identified. Experts can be accessed through questions posted by college personnel on the expert's own blog or online forum, rather than expecting the expert to participate in a college-exclusive discussion.

## **Data Limitations**

There is no labor market information available on mobile media occupations. The mobile media jobs that employers name "app developer", "mobile site developer", etc. do not have occupational codes and therefore any available labor market data. These jobs are grouped with other IT jobs and some marketing jobs as well, which makes it impossible to quantify accurately based on data provided by the Employment Development Department or the Department of Labor. The growth of mobile media is creating new employment for consultants who help companies understand how to use social media to market their business, and mobile media to reorganize some of their operations or services. From employers' testimonies, there is a huge need for app developers, but it is not quantifiable since this occupation is not isolated for measurement.

The problem remains the same at the industry level. Mobile media is not an industry but a technology that touches virtually all industries. There are currently no formulas to calculate how many jobs are impacted. For these reasons, the Center of Excellence is continuing to study the impact of mobile media on the workforce by conducting a large scale employer survey. Findings will be presented in a second report which will be posted at [www.coecc.net](http://www.coecc.net) in the fall of 2011.

## **Glossary**

Mobile media evolves too rapidly to have a comprehensive glossary in print form. New terms are used every week, so for the latest definitions, please consider the following resource:

**Santa Barbara Mobile Media Institute Glossary -**

[http://mmi.sbccc.edu/index.php?option=com\\_content&view=category&id=153&Itemid=127](http://mmi.sbccc.edu/index.php?option=com_content&view=category&id=153&Itemid=127)

For a more technical, industry oriented glossary, go to:

**GSM World Glossary of Mobile Terms and Acronyms -**

<http://www.gsmworld.com/newsroom/resources/glossary.htm>

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## Appendix A: How to Use this Report

This report is designed to provide current industry data to:

- Define potential strategic opportunities relative to an industry's emerging trends and workforce needs;
- Influence and inform local college program planning and resource development;
- Promote a future-oriented and market responsive way of thinking among stakeholders; and,
- Assist faculty, Economic Development and CTE administrators, and Community and Contract Education programs in connecting with industry partners.

The information in this report has been validated by employers and also includes a listing of what programs are already being offered by colleges to address those workforce needs. In some instances, the labor market information and industry validation will suggest that colleges might not want to begin or add programs, thereby avoiding needless replication and low enrollments.

### ***About the Centers of Excellence***

The Centers of Excellence (COE), in partnership with business and industry, deliver regional workforce research customized for community college decision making and resource development. This information has proven valuable to colleges in beginning, revising, or updating economic development and Career Technical Education (CTE) programs, strengthening grant applications, assisting in the accreditation process, and in supporting strategic planning efforts.

The Centers of Excellence Initiative is funded in part by the Chancellor's Office, California Community Colleges, Economic and Workforce Development Program. The total grant amount (grant number 10-305-016 for \$205,000 represents funding for multiple projects and written reports through the Center of Excellence. The Centers aspire to be the premier source of regional economic and workforce information and insight for California's community colleges.

More information about the Centers of Excellence is available at [www.coeccc.net](http://www.coeccc.net).

### ***Important Disclaimer***

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings; however, neither the Centers of Excellence, COE host District, nor California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives based upon components or recommendations contained in this study.

## Appendix B: Job Requirements and Challenges for Mobile Designers and Mobile Software Engineers

**Mobile Designers** are the bridge between the end user and the engineering community. Unlike the web or mainstream design world, mobile designers cannot be simply visually or brand-oriented. They must keep up to date with the latest technologies and devices, and maintain client and company education. Mobile designers need to be highly conceptual, understand the importance of brand, and yet maintain a close eye on the usability and end-users specific needs.

While mobile devices are becoming smaller and more compact, the amount of information they need to convey is increasing. The constant addition of features creates layers of complexity in navigation and usability of mobile user interfaces. Mobile designers and developers need to understand how to create the best user experience possible within these constraints. Compared to the desktop web environment, the mobile web has an entirely different set of user requirements to consider.<sup>42</sup> Some of the unique challenges mobile designers face are:<sup>43</sup>

- Current mobile device networks don't run in the same speed as broadband devices, but users expect a similar experience
- Mobile web designs are displayed in many different ways on devices of varying size, style, and technical capability. Cross-device mobile design is difficult or may not even be possible at this time.
- Desktop-based web designs used one markup language: HTML. The Mobile Web uses HTML5 and also uses WML and iOS for Apple devices and Android for Android devices.
- Mobile web sites can be designed "from scratch" or modified from existing code. Rescaling the dimensions of an existing site can be difficult and it is not guaranteed that the modification will work on all mobile devices.
- Markup language needs to be as clean, small, and standards-based as possible to avoid the problems presented by speed issues on mobile devices.
- Lay out of web pages on mobile devices is problematic because:
  - Mobile devices have different levels of quality and resolutions
  - Mobile devices may or may not support zooming, others scroll content, which is more difficult because of the small screen
  - Content needs to be designed in a single column layout because multi-column layouts often break because the required space to meet the needs of the content cannot span beyond the physical space of the viewport unless passive zooming and scaling comes into play.
  - Mobile layout should incorporate large and easy-to-press links and clickable objects so these often must be redesigned from the desktop version of the web site.
  - Reducing the number of clicks required to achieve an action is important in mobile web designs.
  - Content must be streamlined, along with reduction of excess images, text and media to cope with speed issues, the cost of browsing the web and caps on data allowances being put in place. All copy must be reengineered to accommodate/reduce the need for scrolling, small file sizes, quick readability and bandwidth restraints.
  - Large background images or byte-heavy info graphics can be problematic when viewed on small screen devices.
  - When utilizing video and audio, some formats aren't compatible on all devices, like Flash. File sizes need to be optimized and auto-play formats avoided.

<sup>42</sup> Gotomobile, "Mobile Designer," online at <http://www.gotomobile.com/archives/the-mobile-designer>

<sup>43</sup> Dawson, Alexander, "Mobile Web Design: Best Practices," Six Revisions, April 18, 2010, online at <http://sixrevisions.com/web-development/mobile-web-design-best-practices/>

**Mobile Software Engineers:** The web development community has been challenged by the demands of the emerging technologies and applications for the mobile web. Advanced mobile devices and their sophisticated operating systems pose new challenges to software engineering for mobile devices. To survive in the mobile design environment, an engineer must first have rigorous training and hands-on experience in fundamentals of computer science, software engineering principles, programming languages, architectures and tools for creating quality and efficient software.

Two important areas of mobile software engineering are efficiency and interoperability. Efficiency applies to many aspects of mobile computing, such as algorithms, power consumption, network access, data storage, distributed computing, visualization, user interface, and ergonomics. Meanwhile, interoperability focuses on making various mobile devices collaborate effectively, efficiently and reliably with each other as well as with other computers and devices by means of open standards.<sup>44</sup>

These key considerations in mobile software engineering provide a glimpse at the wide set of skills required of the mobile developer:

- Highly efficient systems and algorithms for low power consumption
- Innovative techniques to reduce wireless network access
- Smart ways of distributing and reducing the computation workload
- Intuitive, easy-to-use and appealing user interfaces to access, manipulate and visualize information
- Interoperable solutions based on open standards that support collaboration across different mobile devices as well as with traditional desktop environments
- Open source that promote collaborative, low cost development of mobile software
- Reliable security and privacy measures related to access and sharing of data
- Automated and hassle-free means of installing and updating software.<sup>45</sup>

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<sup>44</sup> Gerson Lehrman Group, "Software Engineering for Mobile Applications and Systems," April 7, 2010, online at <http://www.glggroup.com/NewsWatchPrefs/Print.aspx?pid=51393>

<sup>45</sup> Gerson Lehrman Group, "Software Engineering for Mobile Applications and Systems," April 7, 2010, online at <http://www.glggroup.com/NewsWatchPrefs/Print.aspx?pid=51393>

## Appendix C: Integration of Mobile Media across Industry Sectors

### Communications

Communications companies from print publishers to broadcast news services are creating dedicated positions and departments in mobile media. At CNN, for example, there is an entire team dedicated to mobile. The mobile producer informs others in the newsroom of the network's mobile strategy and ensures their participation and help in improving it.<sup>46</sup>

Print and broadcast operations are creating mobile-specific positions in their newsrooms, resulting in more traffic to their mobile sites, increased ad revenue and more interaction with their audiences. Arthur Howe, CEO of Verve, a wireless technology developer that works with media companies, said he has noticed that more news organizations are creating such positions in an effort to make mobile news delivery a priority. "You need somebody to be a central manager who has access to all the departments that are going to play a key role in your mobile strategy," Howe said. "Increasingly, news organizations are understanding that this is going to be essential to their future."<sup>47</sup>

A search for mobile media jobs in the Los Angeles Times yields numerous opportunities provided in print media and publishing. Every major newspaper and service in the U.S. has a well developed mobile presence. Rupert Murdoch has launched The Daily, a newspaper exclusively available on iPad.<sup>48</sup> In the first nine months of its availability, the New York Times iPad app was downloaded 1.5 million times.<sup>49</sup>

### Healthcare

The healthcare sector's adoption of mobile media is widespread and touches both patient and caregiver in numerous ways. Mobile applications support prescription and drug management, as well as patient management and care in almost every health setting. Patient-centered applications will include the mobile Personal Health Record (mPHR) which will be carried by patients to all of their doctors, medical appointments, and procedures.<sup>50</sup> Patient care and wellness will be supported by applications like Diamedic, which allows diabetics to record their blood sugar levels and insulin doses for transmission and monitoring by care givers.<sup>51</sup> Medical facilities can even use mobile device services to maintain their equipment and facilities.<sup>52</sup>

### Banking

Despite security issues and concerns, the use of mobile devices for a variety of banking services is growing. Current uses include account alerts, security alerts, account balances and updates, customer service, branch or ATM location information, bill pay services, fund transfers, transaction verifications, and mortgage alerts. In the future, bank customers will also be able to conduct mobile commerce, make contactless payments, and conduct a variety of location-based services.<sup>53</sup> In addition to larger banks

<sup>46</sup> Tenore, Mallory Jean, "5 Reasons the Sentinel, CNN and Philly.com Have Added Mobile Jobs," Poynter, June 24, 2010, online at <http://www.poynter.org/column.asp?id=134&aid=185750>

<sup>47</sup> Tenore, Mallory Jean, "5 Reasons the Sentinel, CNN and Philly.com Have Added Mobile Jobs," Poynter, June 24, 2010, online at <http://www.poynter.org/column.asp?id=134&aid=185750>

<sup>48</sup> Kiesso, Damon, "First Look at The Daily, Murdoch's iPad paper," Poynter, January 11, 2011, online at <http://www.poynter.org/latest-news/media-lab/mobile-media/114499/the-first-look-at-the-daily-rupert-murdochs-ipad-newspaper>

<sup>49</sup> Plessner, Andy, "Exclusive: New York Times i-Pad App Nearing 1.5 Million Downloads," January 12, 2011, Beet.TV online at <http://www.beet.tv/2011/01/timesipad.html>

<sup>50</sup> Deloitte, "The Personal Health Record, Barriers and Opportunities to Accelerate Use," September 14, 2010, online at <http://www.deloitte.com/us/2010mobilepersonalhealthrecord>

<sup>51</sup> McManus, Richard, "Top 10 Mobile Trends of 2010, Part 3, Emerging Markets," April 22, 2010, ReadWriteWeb, online at [http://www.readwriteweb.com/archives/top\\_10\\_mobile\\_trends\\_of\\_2010\\_part\\_3\\_emerging\\_markets.php](http://www.readwriteweb.com/archives/top_10_mobile_trends_of_2010_part_3_emerging_markets.php)

<sup>52</sup> MobiHealthNews online at <http://mobihealthnews.com/about/>

<sup>53</sup> Mobile Marketing Association, "Mobile Banking Overview," January 2009, online at <http://www.mmaglobal.com/mbankingoverview.pdf>

like Bank of America that provide their own mobile services to customers, there are independent companies like Mobile Banking who provide applications that support mobile banking.<sup>54</sup>

### **Education**

The top trend noted in the 2010 Horizon Report is “Mobile computing, by which we mean use of the network-capable devices students are already carrying.” The report notes the increasing number of faculty and instructional technology staff who are experimenting with mobile applications and the use of mobile devices in and outside of the classroom. Among the most common devices seen in today’s classroom are electronic books, iPods and iPads, tablet computers with Wi-Fi capabilities, and Smartphones.<sup>55</sup> Laurie Burruss, Director of Digital Media at Pasadena City College, stated that, “Every mobile experience is an educational and transformative experience.” Her work in the area of instructional design for mobile devices is aimed at capitalizing on the high percentage of students who carry and use smart phones during their classroom experiences.

The Horizon Report cites these areas of technological progress in education, all of which will have significant mobile applications: extended learning, ubiquitous wireless, intelligent searching, educational gaming, social networks and knowledge webs, and context-aware computer/augmented reality.<sup>56</sup> The challenges, as noted in the Higher Education Mobile Handbook<sup>57</sup> include the infrastructure costs of enabling wireless networks on campus and the schools’ primary focus on academics, which reduce time and attention available for implementing new technologies. As a side note, the report also recognizes as a major challenge the need to get more students interested in degrees in computer science so the IT workforce will be available, in turn, to develop mobile applications that support education.

### **Commerce**

Much of the excitement and energy around mobile device development comes as a result of the opportunities for mobile commerce. The wide variety of mobile opportunities can be seen in the list of the top 10 mobile applications of 2010 recognized by Mobile Marketer: Chase Bank’s mobile banking app, Angry Birds mobile games suite, The New York Times online news service, Facebook’s mobile app, The Weather Channel’s information and forecasting services, Groupon’s online coupon and discounts, LocalEats 100 places to dine app, Yelp’s location-based service which lets friends know where the user is physically, Kayak’s mobile travel assistant, and ESPN radio’s continuous sports feed via streaming radio.<sup>58</sup> Through apps and mobile sites, customers can conveniently and effortlessly shop and purchase items to be charged to their account and delivered to their homes. They can place an order at a restaurant so that the food will be ready when they arrive for pick up. The possibilities are endless.

### **Marketing**

As mobile plays an increasingly important role in the marketing mix, agencies strive to meet their clients’ demands for integrated marketing campaigns that leverage the mobile channel. The mobile web gives companies a new way to reach customers and the willingness of users to pay for services delivered to their mobile devices makes this a lucrative marketing channel.<sup>59</sup>

Companies like Velti give advertising agencies tools to build or expand into the mobile arena by adding mobile services to their existing offerings or starting new business lines focused on the mobile channel. For example, Velti’s mGage™ platform enables agencies to create campaigns and allocate

<sup>54</sup> Mobile Banking, “Welcome to The Future of Banking,” online at [http://www.mobilebanking.com/learn\\_more](http://www.mobilebanking.com/learn_more)

<sup>55</sup> The Horizon Project, 2010 Horizon Report, The Web Version, “Technologies to Watch,” online at <http://wp.nmc.org/horizon2010/chapters/technologies/>

<sup>56</sup> The New Media Consortia, The Horizon Report 2005, online at [www.newmediacenter.org/pdf/2005\\_Horizon\\_Report.pdf](http://www.newmediacenter.org/pdf/2005_Horizon_Report.pdf)

<sup>57</sup> Center for Digital Education, Higher Education Mobile Learning Handbook, Republic Inc., 2005, online at [http://mmi.sbccc.edu/images/pdf/HED\\_Mobile\\_Learning\\_Handbook.pdf](http://mmi.sbccc.edu/images/pdf/HED_Mobile_Learning_Handbook.pdf)

<sup>58</sup> Tsurulnik, Giselle, “Top 10 Mobile Applications of 2101,” Mobile Marketer, December 28, 2010, online at <http://www.mobilecommercedaily.com/tag/mobile-retail/>

<sup>59</sup> Carson, Jonathan, “The State of Apps: Fresh Insights From Neilson’s Mobile App Playbook,” September 2010, Presentation at AppNation Conference, online at <http://www.wipconnector.com/index.php/tip/117>

their clients' budgets across multiple mobile advertising and marketing service options, such as media planning and buying, mobile site and application production, text engagement, mobile customer relationship management, and more.<sup>60</sup>

The Mobile Marketing Association (MMA) produced a strategy paper in 2008 outlining the various advertising opportunities provided by mobile applications. Their educational paper includes options for integrating advertising into the application logic as well as methods for inserting advertising into mobile applications. They also offer criteria for creating and executing successful mobile campaigns.<sup>61</sup>

**Business**

Mobile business applications and web sites give companies the ability to carry out all aspects of their business regardless of the location of employees. Rhianna Collier, Director of the Software and Information Industry Association (SIIA) Software Division, notes, "Individuals have access to all needed services and information via a mobile device, whether it be email, customer relationship management, workflow management, online collaboration, or even financial transactions, just to name a few."<sup>62</sup> For instance, Kelly Blue Book has a mobile site and apps to evaluate the value of a vehicle or access any of the services people would traditionally obtain by using a desktop computer. Netflix has an app for people to manage their DVD queue from their portable devices. AAA has an app to locate members and send a tow-truck. Mobile media allows companies in all business areas to streamline their operations, and enhance convenience and services to customers.

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<sup>60</sup> Velti, "Meet Your Clients Demands by Adding Mobile to the Mix, online at <http://www.mediacannon.com/solutions/agencies>

<sup>61</sup> Mobile Marketing Association, Mobile Applications, Version 1.0, September 2008, online at <http://www.mmaglobal.com/mobileapplications.pdf>

<sup>62</sup> Loss, Bill, "SIIA CEO Interview (Part 3)," Mobility News, January 21, 2011, online at <http://www.siiq.net/aam/2010/>

## Appendix D: Full Sail University's Bachelors of Science in Mobile Development<sup>63</sup>

### PROGRAM CORE

Code	Course	Credit Hours
MDV 3330	Advanced Scalable Data Infrastructures	4.0
MDV 2210	Advanced Visual Frameworks	4.0
MDV 2550	Apple Development Language: Objective C I	4.0
MDV 3550	Apple Development Language: Objective C II	4.0
MDV 4210	Application Deployment I: iPhone and iPad	4.0
MDV 4330	Application Deployment II: Android	4.0
MDV 4510	Cross-Platform Mobile Development	4.0
MDV 4710	Immersive Application Deployment	4.0
MDV 4910	Integrated Product Development	4.0
MDV 4920	Integrated Product Deployment	4.0
MDV 2830	Java I 4.0 MDV 3830 Java II	4.0
MDV 3910	Mobile Business and Marketing	4.0
MDV 3630	Mobile Development Frameworks I	4.0
MDV 3730	Mobile Development Frameworks II	4.0
MDV 3850	Mobile Development Frameworks III	4.0
MDV 4630	Mobile Game Design	4.0
MDV 1630	Mobile Interfaces and Usability	4.0
MDV 1310	Mobile Media Design I	4.0
MDV 1410	Mobile Media Design II	4.0
MDV 4110	Mobile Player Experience	4.0
MDV 3110	Mobile User Experience	4.0
PMA101	Project Management and Assessment I	1.0
PMA102	Project Management and Assessment II	1.0
PMA203	Project Management and Assessment III	1.0
PMA204	Project Management and Assessment IV	1.0
PMA305	Project Management and Assessment V	1.0
PMA306	Project Management and Assessment VI	1.0
PMA407	Project Management and Assessment VII	1.0
PMA408	Project Management and Assessment VIII	1.0
MDV 2330	Scalable Data Infrastructures	4.0
MDV 1830	Visual Frameworks	4.0
<b>Totals:</b>		<b>104.00</b>

### GENERAL EDUCATION

Code	Course	Credit Hours
GEN 2140	Anthropology and Sociology	4.0
ART 2007	Art History	4.0
ENC 1101	English Composition I	4.0
MGF 1040	Finite Math	4.0
PSC 1030	Fundamentals of Physical Science	4.0
SPC 1606	Public Speaking	4.0
MGF 1340	Statistics	4.0
ENC 2110	Technical Writing	4.0
<b>Totals:</b>		<b>32.00</b>

**Total Credit Hours: 136**

**Total Weeks: 128**

<sup>63</sup> Mobile Development Bachelor of Science Degree Program, Full Sail University, 2010 Online Catalog, pp. 160-171, online at [http://online.fullsail.edu/alfresco/ROOT/Shared%20Content/\\_Media/pdf-downloads/FSOnlineCatalog2010.pdf](http://online.fullsail.edu/alfresco/ROOT/Shared%20Content/_Media/pdf-downloads/FSOnlineCatalog2010.pdf)