



TSTC TECH BRIEF

TEXAS STATE TECHNICAL COLLEGE • FORECASTING

MOBILE APPLICATION DEVELOPMENTS

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[For an in-depth look on Mobile Application Developments, go to forecasting.tstc.edu and click on the TechBriefs tab. ■](#)

The market for mobile software applications is exploding due to the rapid rise of smartphones and tablets. The popularity of these new products creates an acute demand for development talent but there are few college programs that provide opportunities for learners to develop these new competencies. Based on our findings, we offer the following seven recommendations for colleges:

1. Integrate new mobile app development competencies into existing software development courses.
2. Offer specialized courses for mobile app development.
3. Consider offering fast track training for more experienced programmers.
4. Be cautious about developing overly specialized awards in mobile application development.
5. Host mobile app development competitions.
6. Update mobile app curriculum at least once a semester.
7. Independent contractor competencies are particularly relevant to mobile app development.

WHAT IS A MOBILE APP?

Mobile applications, herein referenced to as mobile apps, are software applications that run on mobile devices, principally smartphones and tablet computers. Mobile apps allow users to achieve the utility they get from the web (e.g. email, web search, social media participation) while on the move as well as additional functions not available via the web alone. What distinguishes mobile devices and apps device and app from the

desktop computers is their enabling the user to interact with the environment in new ways. An athlete on a training run is given feedback on pace, distance, altitude, and heart rate. A casual stargazer looks at the sky, aims a smartphone upwards and is instantly given the names, coordinates and other astronomical information for exactly that portion of the sky. A pub-goer enjoys a drink with friends and instead of waiting for the bill, merely issues a payment from his phone and leaves. A confounded traveler says “can you direct me to the train station?” into the mobile device and it plays the question back in the local language. Through geo-location and scanner apps, a business can track personnel and goods in real time. Think of it: you should never have to reserve a four or six hour segment of your day waiting for the cable guy again. All of these apps are currently on the market.

As mobile computing power expands, energy consumption becomes much more efficient, and sensor technology becomes smaller and cheaper, mobile apps will become much more prevalent, useful, and complex. Healthcare is particularly ripe for mobile app development. Soon diabetics may be able to monitor their blood sugar in real time, perhaps continuously, without pricks. Diagnostic surveillance in hospitals that currently require a roomful of equipment and hospital admission may soon be available on a phone on an outpatient basis. Home health care aides will use GPS-enabled electronic visit verification on their mobile devices for legal compliance and reimbursement. Mobile apps will change the way we bank, shop, interact with government, and communicate with our families and colleagues.

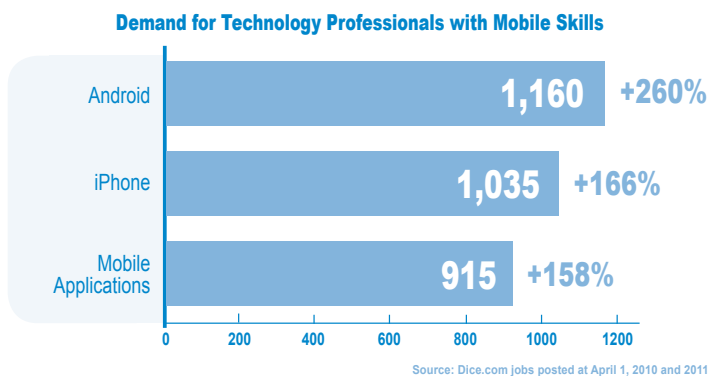
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MOBILE APP MARKET

The mobile app market is in its infancy and it is exploding. Apple hit \$1.7B in app sales in 2010 and is on track to hit \$4B in 2011. Chetan Sharma estimates that mobile apps will reach \$17.5 billion by 2012. According to mobile market research firm research2guidance, the market for mobile application development services—including app development, management, distribution and extension services—will grow from \$10B in 2010 to \$100 billion by 2015. Although these studies use different definitions for mobile development and different timeframes, the message is clear: mobile apps development is expected to become a huge business extraordinarily quickly. Mobile App Developers Job Market As fast as the market for mobile apps is growing, the market for mobile app developers is growing even faster. A snapshot of Google Trends shows us that practically no one searched for “mobile application development” prior to the end of 2008. Interest has been up and to the right ever since.

DEMAND SIDE—EMPLOYERS

Our own observations of job posting services and a handful of industry studies reveal that the market for mobile app developers is dramatically underserved. In June 2011 Infoworld identified six IT jobs “worth chasing”. Two of them related to mobile: mobile technology manager and enterprise mobile developer. Dice, a web site for technical job postings, conducted a study, “America’s Tech Talent Crunch,” focusing on the talent needs of the IT sector in general. The organization identified mobile as one of the lead shortages and illustrated the point by comparing job postings on their site for the first quarters of 2010 and 2011. Demand was up 150-260% year over year.



The study also noted that elance.com, a website for freelancers, reports comparable increases in demand. They had 4,500 mobile app developer jobs posted in Q1 2011, more than a 100 percent increase over the prior year. Although Dice noted an ample supply of Web and Java talent, there are too few experienced developers skilled in building apps for iPhone, iPad, Android or other platforms due to their newness. The study also identified states with the most acute talent shortages. Texas ranked third in having the greatest IT talent shortage overall, behind only California and New Jersey.

SUPPLY SIDE-LEARNERS

A survey of Texas colleges revealed that only a handful of Texas colleges have begun offering new courses focusing on mobile app development and only one college appears to be offering full degree and certificate programs in mobile development. Several other colleges indicate an interest in offering similar courses.

SIGNS OF DEMAND FOR MOBILE APP COMPETENCIES

Developers are eager and willing to pay for the opportunity to expand their mobile development skills sets. Case in point: World Wide Developer Conference is an Apple-related development-focused event. It is not for sales, deal-making, or networking, etc. When the event became exclusively mobile-focused in 2008, they had their first sell-out in 60 days. Every year since then registration has filled more quickly. In 2011 the 5,000 person, \$1,500 event sold out in less than a day. The pattern has been very similar for Google’s mobile developer event. The demand for mobile app training is clear, pressing, but is less pervasive in current college offerings. One of the ironies is that while there are few formal opportunities for learning to develop mobile apps, colleges themselves are advertising for developers to create mobile education apps.

MOBILE APP DEVELOPER COMPENSATION

In their survey, Dice asked over 250 tech recruiters what they thought was the market rate for compensation for mobile engineers and designers. According to this survey, nearly a third of employers had to raise compensation for mobile developers “higher than normal” due to the increase in demand relative to supply. A sample of Texas companies on Dice’s site are offering pay of \$85K to \$90K for 1-5 years of mobile development experience.

Mobile Application Development was one of eight “dream jobs” identified by CBS Money Watch. Statistics were gathered from the Bureau of Labor, salary sites, professional trade groups, and recruiters to identify eight jobs requiring no more than two years of additional training to secure a position, a reasonably large and growing number of overall jobs, and six-figure salaries to top earners in the field (generally, the top 10 percent of those employed). The study estimates mobile app development salaries of \$115,000 for top earners with projected job growth of 131 percent through 2011.

FREELANCE VS. FULL-TIME

Compensation data must be viewed in light of the fact that many mobile development employment opportunities are not full

time. Even companies prepared to make large investments in mobile are reluctant to bring on full-time staff; instead, they are contracting with freelancers and third party development companies. Consultants typically earn more than their company-employed counterparts. In our review of two tech-related job sites, we found 40% of Texas-based posting were for full-time employment while the remainder were for full- and part-time freelance positions.

The prevalence of freelance work raises two important issues:

- Mobile developers, in addition to technical skills, will have to know how to market their abilities, execute contracts, maintain client relations, and manage their own workflow.
- Many of the freelance positions are not location-specific, which presents opportunities and challenges. Clearly, developers with advanced skill sets are highly sought after and companies are willing to be flexible on geography when acquiring talent. However, the irrelevance of location for many assignments means mobile developers are competing in a global marketplace where talent from abroad may undercut earnings potential.

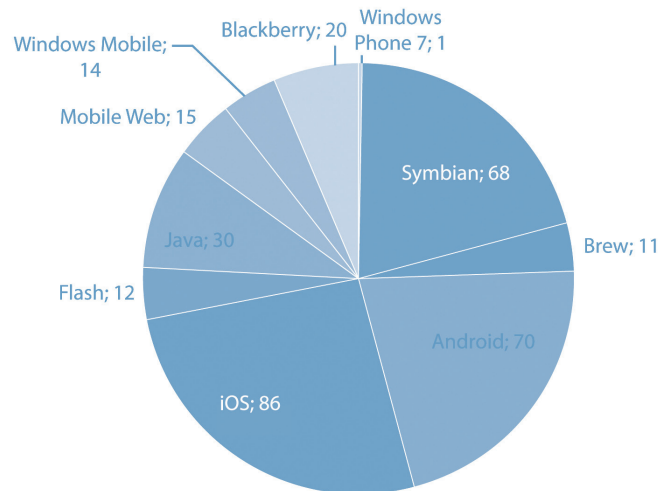
COMPETENCIES

“The need for strong Java, HTML and general technical skills goes without saying. Developers who are steeped in the tenets of modern object-oriented programming and understand user interfaces and design patterns will have a leg up. A potentially more difficult transition is coming to terms with the new design paradigm that mobile platforms represent: In addition to recognizing that you’ll be designing apps for the smaller real estate of smartphone screens, you have to understand how users interact with their devices and grasp the need to deliver highly targeted functionality.”

Diverse competencies required

Because the mobile app marketplace is emergent, industry leaders differ widely in their opinions about what the key markets and foundational skill sets will be. C (+, ++, #) vs. Java vs. Ruby, Apple vs. Android, mobile web vs. native app, consumer app

Current Skill Demand for Mobile Developers



vs. enterprise apps. Luckily for today’s learners, they don’t have to guess what is going to be the winner. There are clear demands for jobs with specific skills now and these skills, if adapted overtime, will position them best to take advantage opportunities in the mobile app market as they emerge. In all likelihood the market will not evolve in a VHS vs. Betamax way; businesses and consumers have become accustomed to having diverse technology options. Where there is demand, some developer will fill it. If anything, the mobile app market is likely to become more diverse, which means a mobile app developer most certainly must have the ability to upgrade skills continuously.

Developers are already demonstrating they understand the need for diverse competencies:

“The very reasons which are driving developers to spread their bets across all and any new platforms should indicate the potential for new platforms and the sustainability of small platforms. The thesis that one dominant platform wins the mobile “war” is naive. The post-PC era will be a multi-platform era. Developers already understand this.” Horace Dediu, The Post-PC era will be a multi-platform era

Digi provides a helpful graphic of the lifespan of mobile platforms and speculates about the near-term use and popularity of each over the next two years.

Digi’s argument for technological pluralism is well-taken and should be an important consideration for the

creation of mobile app development curricula; however, the current job market requires certain skills. For a comprehensive list of corresponding tools, languages, and competencies by platform see http://en.wikipedia.org/wiki/Mobile_app#Platform_development_environment.

What skills are needed by employers?

Despite the emergence of new platforms, our analysis of job postings reveals there is as yet little demand for mobile apps using the newest platforms. This circumstance may change in the very near term and bears watching. We looked at 327 postings on mobiledevjobs.com. Current demand for specific platform and program development skills is displayed below. Seventy-five percent of the openings are for platform-specific native app developers. There were no postings seeking MeeGo, QNX, Bada, LiMo experience or skills.

Each of the platforms for mobile applications also has an integrated development environment which provides tools to allow a developer to write, test, and deploy applications into the target platform environment. While the demand for mobile app development talent appears to be acute now, things may change in the future, not because demand for mobile applications will decrease but the SDKs (software development kits) offered by platform companies (Apple, Google, Android etc.) are getting simpler to use. However, experienced, cross-platform talent will likely be in

demand for some time. Visit the TSTC website for a list of sample Texas Mobile Development Companies.

TRAINING OPPORTUNITIES FOR COMPETENCY DEVELOPMENT

Mobile is a different case from many other tech workforce challenges in that there are few barriers to developing a program for mobile applications development. In fact, several companies with software and hardware in the mobile space have devised their own curricula and development tools, often providing them for free. A number of for-profit companies also have developed their own programs — particularly those focused on a specific device (e.g. Android or iPhone). The quality and content of these programs is difficult to discern. As such, technical schools have a number of resources to draw on as well as a number of competitors of varying quality. In addition to formal programs, there are countless informal, self-organized work groups and workshops that attract people to the field and give them the skills and market intelligence to guide their professional development. One of the most well-known of these events is MobileMonday, a national organized but locally executed group that brings new technologies to prospective developers. Meetup.com, a web service that helps people with shared interests find each other, currently lists 390 groups related to mobile applications.

We offer a few examples of mobile app development that have very different audiences, objectives and outcomes.

Texas Training Opportunities

COLLIN COLLEGE will offer mobile development degree and certificate programs in the Fall of 2011. Students can pursue Android Mobile Development, iOS Mobile Development, and J2ME

Mobile Development tracks. The Collin College degree programs share a common core of technology and academic courses with specialized courses in each subject area corresponding to the degree program.

Common Core Mobile Technology Courses at Collin College:

- COSC 1315 Fundamentals of Programming
- ITSE 1311 Beginning Web Programming
- ITSW 1307 Introduction to Database – Access
- IMED 1341 Interface Design
- ITSE 2302 Intermediate Web Programming
- ITSE 2309 Database Programming – SQL
- MED 2309 Internet Commerce
- INEW 2330

Comprehensive Software Program: Planning and Design (Capstone)

For a full breakdown of each degree and certificate visit Collin College's E-Business Development Program at [:/academics/programs/ebusinessdev.html](http://academics/programs/ebusinessdev.html). In addition to providing mobile app development offerings to students, in July 2011 Collin College sponsored a five-day NSF-funded workshop on mobile app development for high school, college and university faculty and staff.

MIDLAND COLLEGE has offered a continuing educating class in basic application development and mobile development courses are currently under consideration at **TARRANT COUNTY COMMUNITY COLLEGE** and **EL PASO COMMUNITY COLLEGE** according to survey responses. It is likely that some additional offerings exist at other Texas colleges who did not respond to the TACTE email survey inquiry.

The High Technology Institute at **AUSTIN COMMUNITY COLLEGE** currently offers a two-part technical certification series developed and taught by adjunct faculty for iOS developers. Faculty have developed a number of mobile app specific courses:

- ITSE 2071 iPhone Programming (42 hours) This course teaches the basics of iPhone app development in Objective-C utilizing the user interface framework Cocoa Touch, integrated

development environment Xcode, and unique capabilities such as the iPhone GPS, compass, Wi-Fi, OpenGL ES, and accelerometer. Students who complete this course will be able to use Xcode compilers and tools, write simple object oriented programs in Objective-C, use mobile user interfaces, create a mobile user interface, use general purpose debugging tools, and use general purpose performance analysis tool.

- ITSE 2072 iOS Game Programming (42 hours) This course covers programming 2D games for casual players using the Cocos2D library. At the end of this class, the student should have a simple game worthy of publishing on the Apple App Store and be able to use the Cocos2D framework to write simple games, use Xcode compilers and tools, describe sprite animation, develop user interface and game interaction, integrate art work into your game, and interface with Apple's Game Center leader board/achievements system.

Although formal certificate and degree programs are being offered by colleges, many of the training opportunities were and will continue to be filled by unaccredited institutions and through informal channels. Examples of these offerings include:

For-profit certification program

The International Institute of Mobile Technologies, which appears to be a for-profit education and consulting firm, offers certification for established programmers in a variety of mobile applications platforms. Students may enroll in the entire program or in individual courses. The course offerings include:

- Foundations of Mobile Application Development
- Mobile Web Programming
- iPhone Programming I, II, III
- Android Programming I, II, III
- Blackberry Programming I, II, III
- iPad Programming I, II, III
- Windows Mobile Programming I, II, III

Free online mobile app training

One of the most comprehensive mobile app development offerings we found is offered by Stanford University

IN OUR NEXT ISSUE

Smart phones and mobile apps are now fully integrated into our daily lives. There are apps for social networking, discovering a new place to eat, checking a bank balance, getting directions, and—the most popular—playing games. Consumers increasingly expect companies to enable easy and convenient access to their services through a mobile device. Even local governments and schools are launching apps of their own. In our next TechBrief we look at mobile applications, explain the differences between native apps and mobile web apps, and make recommendations on steps colleges should take to ensure their graduates have an advantage in this growing industry sector.

SUGGEST A TOPIC

Do you have a technology or occupation you would like TSTC Forecasting to consider researching? Submit your topic online at www.forecasting.tstc.edu.

for iOS (iPhone and iPad apps). Stanford offers approximately 60 hours of free instructional podcast via iTunes. The most recent class includes the following topics:

Developing Apps for iOS

1. Introduction to Cocoa Touch, Objective-C, Tools and MVC
2. Building a Simple Calculator
3. Objective-C and Foundation Frameworks
4. Foundation and Memory Management
5. Protocols and Views
6. Application and View Controller Lifecycle, Navigation Controller
7. More Controllers of Controllers, iPad, Universal Applications
8. Gesture Recognizers
9. Image View, Web View and Scroll
10. Table View
11. Persistence
12. Core Data and Table Views
13. Debugging
14. Core Location and Map Kit
15. Blocks and Multithreading
16. Editable Text, Modal View Controllers, and View Animation
17. Core Motion, Segmented Control and Alerts
18. Media
19. Building Flipboard (and newstand app)
20. Accessibility on iOS
21. Kleiner Perkins iFund (Venture capital for mobile apps)

There are Android development courses in iTunes but, understandably, fewer in number and far less comprehensive. There does not appear to be analogous instructional podcasts in the Android marketplace.

TRENDS

The mobile device market is volatile, diverse, and in a state of flux. Despite current demand for skills to develop apps for Nokia, Palm, and Blackberry these companies are losing tens of millions of users. A half million Blackberries go out of service in the US each month. According to Gartner Inc., Android operating system will become the most popular by the end of the year accounting for a quarter of all smartphone sales in 2011. Apple will remain a powerful platform and the second most powerful operating system in the future.

Perhaps the newest technology to be added

to mobile devices is near field communication. Near field communication allows devices in close proximity to exchange data such as making a mobile payment. NFC has had its ups and downs since emerging nearly a decade ago but is likely to finally become an integral part of the mobile device landscape. Although none of the job postings mentioned near field communication, NFC development will likely soon become and an essential part of mobile app development. A recent Juniper Research study predicts rapid growth in NFC services for smartphones over the next three years. There will be 300M NFC-enabled smartphones on the market by 2014, supporting in particular retail, coupons and mobile payments in North America, Europe and other developed countries.

Spectrum constraints could potentially upend the mobile app industry. One big countervailing piece of information that could turn mobile on its head is spectrum constraint. Smartphone usage is growing so quickly that wireless carriers will have enormous difficulty keeping up with spectrum use demand. One approach they are already using is to charge more for mobile data. The consensus estimate for spectrum use in 2015 will be 35 times 2009 use.

RECOMMENDATIONS FOR COLLEGES

1. Integrate new mobile application development competencies into existing software development courses. New programmers will need foundational programming skill development as well as mobile interface and platform specific skills. For example, faculty offering HTML courses should include some amount of instruction on HTML5 so students can take into consideration mobile uses of the web sites they create. Similarly, computer science programming courses should include mobile versions of the various programming languages and development environments.

2. Offer specialized courses for mobile app development. Specialized mobile app courses, such as those developed at Austin Community College, will augment existing software-related certificates and degree programs and enhance the employability of students by providing unique mobile app development competencies.

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3. Consider offering fast track training for more experience programmers. Such training will allow current software development professionals to gain new mobile competencies quickly and take advantage of the current talent crunch with a la carte courses offered at a premium. These offerings are particularly well-suited to online learning environments.

4. Be cautious about developing overly specialized awards in mobile application development. As the lines between mobile and desktop computing continue to blur, it is anticipated that mobile app development competencies will become standard expectations for programming and web development curriculum; therefore, specialized certificate and degree offerings are likely to result in unnecessary duplication and expense.

5. Host mobile app development competitions. Competitions are a great way to encourage independent learning, identify young talent, and recruit students with complementary offerings at partner colleges. Students would compete for developing the best app along a variety of criteria. Resulting entries also will provide students student with a tangible work-product to demonstrate their abilities to prospective employers and clients.

6. Update mobile app curriculum at least once a semester. Due to the dynamism of the mobile app space, curricula warrant frequent review and modification. Constant changes in platform share, operating systems, technological capabilities, languages, and design standards require colleges to monitor and update curriculum constantly. Look for student competitions to also provide insights into evolving competencies.

7. Independent contractor competencies are particularly relevant to mobile app development. A fair amount of mobile development is performed by independent contractors. As a result, students would likely benefit from competencies related to running their own businesses, particularly for those who have no experience being self-employed. Example curriculum exists in this area and includes basic business and project management skills such as billing, contracts, bookkeeping, legal considerations, time management, etc. This topic of entrepreneurship in the trades will be the subject of a future TechBrief from TSTC Forecasting.