Smartphones Make IBM **Smarter**, *But Not As Expected*

By Nabeel Ahmad and Peter Orton

A 2009 IBM-Columbia University study reveals surprising insight into how employees use smartphones to improve job performance.

Photos by Veer and Shutterstock.com

ALTHOUGH MOBILE PHONES HAVE BECOME AN EXTENSION OF THE WORKPLACE, QUESTIONS PERSIST ABOUT HOW ORGANIZATIONS CAN BEST LEVERAGE THEM TO IMPROVE EMPLOYEE PERFORMANCE AND DEVELOPMENT. To answer some of these questions, IBM conducted a study to examine how its employees actually use their smartphones for their jobs and for skills growth. As a result of the study, IBM has shifted its focus for mobile learning from delivering formal learning modules to just-in-time performance support systems. IBM is now building a new system for executive sellers that provides, via mobile phones, reference checklists of critical information that is useful when preparing for client meetings. IBM Learning is developing a text messaging/SMS system that reminds new hires about relevant learning opportunities. IBM is also preparing a study on the effects of mobile phones in high-growth markets, such as Brazil and China, and how culture affects mobile phone use in the workplace.

Mobile phones are now an integral part of society and the workplace. About 250 million Americans and more than half of the world's population have a mobile phone. In nearly every walk of life, the mobile phone has become a necessity. If you leave home in the morning without cash, you're likely to keep going. But if you forget your mobile phone, you'll probably quickly return to retrieve it. The mobile phone has become a requisite tool in business as well, especially for remote and mobile employees. Although mobile phones have become an extension of the workplace, questions persist about how organizations can best leverage them to improve employee performance and development. To answer some of these questions, IBM conducted a study to examine how its employees actually use their smartphones for their jobs and for skills growth.

Presently, of IBM's 400,000 employees, only 25,000 have smartphones that can access internal IBM services. The users include all current IBM executives, and the number of registered IBM smartphone users is increasing by nearly 1,000 each month. Each user's department pays a nominal fee for the service, and thereafter, employees can access their

Design Tips for Creating Effective Mobile Learning

- **Holistic point of view**—Remember that the mobile phone user also has a desktop computer. You don't need to give them everything on the mobile phone—just the critical information relevant to their mobile needs. The more you focus only on displaying critical information, the more satisfied your users will be with their mobile experience.
- **Web-based or local**—Consider whether your mobile phone application will be accessible through a mobile web browser or installed on the mobile phone. Mobile web-based applications are more accessible to a variety of phones but have limited functionality. Browser identifiers can help customize the layout for mobile web-based applications. Locally installed applications can take advantage of core mobile phone features such as built-in shortcuts, but they require the user to download and install the application. Knowing your audience and understanding their needs will help you decide on the proper course of action.
- **Three screens or fewer**—Allow users to easily access any information in three screens or fewer. Don't force users to click through more than three pages to access what they need. The more clicks, the higher likelihood of distraction, and the user will deviate from the original intent.
- **Content chunks**—Long paragraphs are difficult to read on a mobile device. Instead, segment your content into bullets to visually chunk the information. Consider background shading on alternating table rows. Write shorter sentences. Say the same thing in fewer words.
- **Above and below the fold**—Just as newspapers display critical information "above the fold," you should put the important material on the first screen users see. Reduce vertical scrolling ("below the fold") as much as possible. More content requires more vertical scroll, increasing page load time. Plus, the user may not see it. Move unrelated information to a different page.
- **Images**—Use images sparingly and only if necessary. Images take longer to load than text and often render differently depending on the user's mobile phone. You want to be effective, not fancy.

work email and calendar, as well as the company intranet. They can also use their mobile devices to take online mini-courses and more extensive virtual learning programs as part of their professional development plan.

But do they? Despite increasing mobile phone use, no systematic evidence exists that suggests how employees actually use their mobile phones and applications in the workplace. If indeed they are using it for specific business purposes, does such use improve employee performance? If so, how?

The IBM-Columbia University study

IBM partnered with Columbia University to learn how mobile phones are used and how they affect employee job performance. The "Examining the Effectiveness of a Mobile Electronic Performance System in a Workplace Environment" study also explored design and usability considerations for mobile phone application development and, more specifically, the design of IBM's "Mobile BluePages." Mobile BluePages is an internal company directory suited for IBM's mobile sellers, consultants, technologists, managers, and executives and can be accessed via a mobile web browser. This company directory enhances employees' ability and efficiency to access necessary information to serve each client's needs.

When client-facing employees lack comprehensive information sources on internal company networks or external web materials, the directory provides immediate access to IBM subject matter experts who can help with client-query issues. Users connect with IBM specialists by name, job responsibility, email address, or phone number. They can view each employee's reporting chain for hierarchical connections. This mobile database provides the same information as the desktop version of BluePages, which displays expertise, client-insight information, and contact numbers for more than 400,000 IBM employees and contractors.

Unexpected findings

IBM surveyed and interviewed more than 400 employees about their use of mobile devices and Mobile BluePages. The unexpected results of the study significantly altered IBM's mobile learning approach, causing IBM Learning to reshape its mobile technologies strategy from mobile delivered skills-development modules to networking, collaboration, and just-in-time skills improvement.

Performance support, not courseware. IBM Learning had initially considered that the mobile device would be the ubiquitous delivery channel for IBM's 25,000 employee-development mini-courses that are available anytime and anywhere. But the findings failed to support that claim. Employees in nearly all of IBM's business units across all geographic regions were not to be using their mobile phones for the online courses. Instead, they were using mobile phones almost exclusively

for two main purposes: in-field performance support from colleagues and access to late-breaking information.

IBM employees, especially salespersons and managers, need current, just-in-time information that is relevant to their specific task and contextual to their environment. Development courseware, however, was not as targeted. Development courseware typically requires more dedicated learning time than most mobile IBM employees have when they are in the field. Thus, when the employee is away from the office, personal skills growth takes a distant second to solutions and client service. Time for required coursework happens primarily when employees are in their home office and in front of their desktop computer. So while mobile phones provide an opportunity for IBMers to access formal learning modules at any time and from anywhere, mobile devices were not a commonly used delivery channel for substantial or even mini-courseware development programs.

Mobile devices, however, are favored tools for IBMers' workplace performance, but only when certain elements—ease of use, clarity of information, and speed to access—align appropriately. The study discovered strong interactions among several variables, which created successful user experiences, especially in IBM's Mobile BluePages.

Usability is crucial. Usability is a primary consideration for adoption of mobile phone applications. Presently, most mobile website usability is, at best, mediocre. Usability guru Jakob Nielsen calls the mobile web "neither pleasant nor easy to use." The IBM-Columbia University study uncovered a dramatic increase in both user satisfaction and use after altering mobile interface design to improve user experience.

One of the important insights for mobile device design is derived from the extensive research literature about how innovations are accepted by populations. Users of new applications and inventions across a wide range of industries—medicine, agriculture, and automotive—generally dislike having to learn any new user interface; instead, they prefer previously learned requirements, which Everett Rogers calls "compatibility" with established norms.

For example, no matter how much a new automobile model appears to break style standards and create a novel look and feel for the motorist, designers continue to place the cars' controls in established positions so that drivers do not have to learn new behaviors. In the same manner, IBM's Mobile BluePages is an adaptation of IBM's original BluePages desktop application, which all IBM employees used long before mobile devices were invented and continue to use on desktop computers. Thus, even upon first use, an IBM employee will be familiar with the look, feel, and use of Mobile BluePages because that familiarity simply activates the user's prior knowledge of how to navigate the directory.

Less is more. Another unexpected finding from the study is that employees seem to prefer fewer options and less information on their mobile phones than would be available on their desktop computers. Mobile phone users typically have more immediate, goal-directed intentions than desktop users. The former know what they seek and rarely deviate from the path toward finding that information. Presenting only the most critical information, minus extraneous and potentially distracting segments, is far more desirable than offering a wealth of opportunities.

For example, the desktop version of BluePages not only identifies each employee's areas of expertise and industry focus (important information for sellers seeking deep insights relevant to prospective clients) but also such minutiae as snail-mail addresses, IBM community-interest topics, and subject-matter areas in which employees have less mastery. While it is helpful to know more about the employee, these latter bits of information are irrelevant to the in-field IBMer seeking fast answers to industry or client questions. Nearly all respondents to the survey indicated that they preferred a cleaner, less-cluttered interface, with far fewer informational elements rather than the wide range of features provided by the desktop version.

When client-facing employees lack comprehensive information sources on internal company networks or external web materials, the Mobile BluePages directory provides immediate access to IBM subject matter experts who can help with client-query issues.

30 seconds or less. Innovations diffusion research also identifies audience as a key variable to understanding adoption and usage. Similarly, the IBM-Columbia study uncovered several important distinctions within the population using mobile devices for job performance, and their effect on usage. The IBM audience divides almost cleanly into two groups: those willing to wait up to only 30 seconds for information and those willing to wait as long as necessary. This finding has profound implications on the design of a mobile application—users will quit

Photo courtesy of IBM

The IBM audience divides almost cleanly into two groups: those willing to wait up to only 30 seconds for information and those willing to wait as long as necessary. Users will quit the application if they have to wait too long to access information.

the application if they have to wait too long to access information. Losing half of those waiting for information significantly diminishes reach.

Speed of accessing information should weigh heavily on design considerations. It is a function of good design, efficient programming, and connection speed. We live in a fast-paced world where on-demand access to information has become the norm. If altering design can save a few seconds of waiting without compromising other elements, it is imperative to do so.

A few degrees of separation. Another unexpected finding is that through mobile technology, employees made far more use of one another's hierarchical connections than they did via desktop access. The networking and collaboration capabilities created far more communications with 2nd- and 3rd-level individuals than with the 1st-level individuals originally intended to be the points of contact. In other words, the individual connection via the mobile phone was more of a jumping-off point for increased connections and for better expertise and insight from secondary and tertiary connections than from the primary connection.

This finding is consistent with the famous 1973 Granovetter study "The Strength of Weak Ties," which demonstrated how being connected weakly to new networks provides an individual with far more information and opportunities than her own strong connections. IBM Learning did not expect that this would be a big advantage of mobile learning and thus carry important implications for future mobile learning design.

Improving job performance. Finally, the study's findings strongly suggest a direct, positive relationship between employee confidence level and self-perception of job performance. Because of their ability to locate others quickly and in the time of need, users had an increased perception of their job performance. Many echoed the need to communicate with their teams during travel or time away from the office; just because employees are not always working at their desks need not imply that they should be unavailable or not reachable when needed. It is also clear that the act of displaying the capability of Mobile BluePages to their clients made IBMers feel more confident and in a better position to serve those clients. Lastly, many mentioned the capacity to use the directory effectively during client meetings, which enhanced their perception of performance.

Implications for the future

As a result of the study, IBM has shifted its mobile learning focus from delivering formal learning modules to creating just-in-time performance support systems. IBM is now building a new system for executive sellers that provides, via mobile phones, reference checklists of critical information that is useful when preparing for client meetings. IBM Learning is developing a text messaging/SMS system that reminds new hires about relevant learning opportunities. IBM is also preparing a study on the effects of mobile phones in high-growth markets, such as Brazil and China, and how culture affects mobile phone use in the workplace.

The office of IBM's chief information officer estimates that by 2012, 100,000 IBM employees will use smartphones for work. Most of these phones will be employees' personal devices, signaling a growing trend in the industry in which the lines between personal use and work use of technology are blurring. As a result, more diverse offerings will likely cause IBMers to use their own mobile phones to connect to the IBM network. In June 2009, IBM announced a $100 million investment in mobile research over the next five years, focusing on mobile enablement, emerging markets, and enterprise-to-end-user experience.

Although the Mobile BluePages application is unique to IBM, it is likely that the research-based insights from the IBM-Columbia study will be relevant to many organizations' mobile strategies. An effective mobile solution that focuses on performance support, networking, user experience, and access to just-in-time information can improve employee productivity and leverage the very device that you are likely *not to leave at home.* **T+D**

Nabeel Ahmad *is a learning technologist at IBM; ahmadn@us.ibm.com.* ***Peter Orton*** *is a learning developer at IBM; porton@us.ibm.com.*

Photo courtesy of IBM