

THE
MOBILE
ACADEMY

mLEARNING FOR HIGHER EDUCATION



CLARK N. QUINN



Contents

List of Figures	vii
Preface	ix
Acknowledgments	xi
About the Author	xiii
1 The Mobile Revolution	1
Context	1
Related Experiences	3
Why Higher Education Needs to Pay Attention	4
The Rest of This Book	5
Practice	6
2 Foundations: Mobile	7
Devices	7
Of Platforms and Processing Power	17
Four C'S and Thinking Differently	17
Definition	21
Summary	22
Practice	22
3 Foundations: Learning	23
Making Learning Work	26
Beyond the Basics	33
Summary	37
Practice	37
4 Administration "To Go"	39
Principles	41
Delivery	44

Summary	46
Practice	47
Task Checklist	47
5 Content Is King	49
Media	49
Media Specifics	56
Accessing	58
Summary	61
Practice	61
Content Form	61
6 Practice: Interactivity and Assessment	63
Design	63
Interactions	67
Meta-learning	73
Summary	74
Practice	74
Category Checklist	75
7 Going Social	77
Learning Interactions	78
Social Media	81
Meta-learning	83
Summary	84
Practice	85
Channel Checklist	85
8 Going Beyond	87
Augmented Reality	87
Alternate Reality	89
Adaptive Delivery	91
Moving Forward	93
Practice	94
9 Getting Going: Organizational Issues	95
Design	95
Development	96
Implementation	98
Policies	100
You Gotta Be <i>in</i> It to <i>Get</i> It	102
Practice	104
Bibliography	105
Index	111



The Mobile Revolution

The mobile revolution is truly here. For example, in the case of mobile phones, the odds of finding someone who doesn't own one are close to zero. Cell phones aren't the only mobile device, but they are a growth area because increasingly they include the capabilities of other mobile devices. However, tablets are also on the rise, cannibalizing laptop sales (The Street, 2011). Particularly in the academy, the greatest ownership of mobile devices is in the traditional-aged college student demographic: The Pew Internet February 2010 report points out that adults younger than 30 are more likely to own a cell phone, at an ownership rate of 93% compared with 83% for all adults over 18.

CONTEXT

Globally, access to mobile networks is now available to 90% of the world population, according to the "World in 2010" report put out by the International Telecommunications Union (ITU). Perhaps most importantly, the same ITU report details that the developed world mobile market is reaching saturation, with 116 subscriptions for every 100 eligible individuals. And, unlike laptops, you can't prevent access by shutting down a wireless network; access is now everywhere you get a cell phone signal. Consequently, the question is not whether to allow internet access but how to accommodate it.

Yet campuses have been slow to adapt to the mobilized student. The 2010 Campus Computing survey shows that only 13.1% of institutions already have developed or enabled mobile learning and administrative capabilities, and only another 10.1% are doing so in the 2010–2011 academic year.

The discrepancy between distribution of mobile devices and university uptake likely has several factors, including:

- The relative newness of what David Pogue, New York Times technology writer, calls *app phones*, which not only have internet access but also can host different local software applications
- A turbulent marketplace
- Vendor slowness to invest in what is a relatively new market in tough economic conditions

The ability of phones to provide custom learning solutions is a recent development. While there have been a variety of services delivered, and learning needs met, via text messaging elsewhere, the use of text messaging has been slower to penetrate the U.S. market, and other mechanisms are even more limited. Consequently, the opportunity to provide richer interactions is still emerging.

The marketplace on which to develop those richer interactions has remained unstable. At the time of writing, one of the major players a few years ago, Palm, has essentially disappeared, though the operating system it developed for the next generation may yet achieve success in new hands.

While the platform operating systems are finally seeing some stability, the hardware and marketplace are still in a state of almost constant change, which makes it hard to determine a successful strategy. As a consequence, vendors of tools and technologies have been slow to invest in the development of mobile capabilities.

Yet we now have achieved a state of sufficient stability to start building mobile solutions, and the dynamism that prevented investment is now being exhibited in the market that capitalizes on that investment. Further, the devices also provide internet access, to the point that, for many, mobile is the main form of internet access (OnDevice, 2011).

This leads to our topic: the opportunity and the future, specifically around higher education learning. Mobile has matured and stabilized to the point where

it now makes sense to understand, plan, and start developing mobile solutions. There are already predictions that mobile will fundamentally alter the delivery of learning. With ubiquitous access, why would learning continue to be tied to a location or a time? What we have on tap is the opportunity to revisit the fundamentals of the learning experience and use technology to come closer to the ideals we would like to achieve.

The real opportunity here is to facilitate deeper and more persistent learning. In an all-too apt skit, comedian Father Guido Sarducci talks about the five-minute University: “The idea is that in five minutes you learn what the average college graduate remembers five years after he or she is out of school” (<http://www.youtube.com/watch?v=kO8x8eoU3L4>). The point is that too much of education in general has been tied to industrial efficiency instead of learning effectiveness. As Long and Holeton (2009) point out, the aim was to prepare individuals to be useful factory employees performing repetitive tasks. The classroom model was developed to accommodate the ability to serve a number of students instead of the more inefficient apprenticeship model, and the focus was not on ensuring competency but on finding who would succeed. More fundamentally, what we learn in our college experience is of little use in our everyday lives. And, as Professor Emeritus John Ittelson says, universities are good at resisting disruption from new technologies. Our investment in education disappears too soon after the event. We need to revisit learning. Mobile is not a cure but is a tool to achieve the ends, and consequently it is a catalyst for change.

I believe that technology has been such a catalyst. Arthur C. Clarke said with much foresight, “Any sufficiently advanced technology is indistinguishable from magic” (1984). We really have reached the point where we do have magic, and thus we have the opportunity to ask what we should do with it. When we went back and looked at what makes good learning, to see how to use technology, I think we recoiled in shock from what we were doing in the classroom. So I will characterize effective learning as part of discussing how mobile can be used to facilitate it.

RELATED EXPERIENCES

The use of mobile devices is growing in other arenas. In the corporate market, where productivity improvement opportunities are quickly capitalized on, mobile is finally on the upswing. Examples range from training courses on phones through

performance support and information access capabilities to augmented reality games to build teams and enhance learning. While academic research continues to lead in concepts, the corporate sector tends to move quicker on practical application and larger-scale innovation. They are also more focused on outcomes.

K–12 education, too, is seeing growing use of mobile. From Elliot Soloway’s pioneering work with PDAs for kids (Soloway et al., 1999), collecting data via sensors and uploading, we have seen uses of mobile devices extend from e-books and clickers (audience response systems) for data collection to communication and location-based activities and more. K–12 education has different demands in terms of learner developmental level, ubiquity of devices, and institutional inflexibility, but the goal of formal education is shared.

Around the world, mobile devices have become a tool for empowerment. Farmers have been able to access information about crop prices and free themselves from the tyranny of a single buyer. Health information about safe sex made accessible on cell phones in Africa has the potential to save lives.

Mobile is also changing behaviors. When shoppers are reported going alone into changing rooms but staying longer, it turns out that they are taking pictures of themselves in their selections and sharing with their friends to get opinions. Actually turning off a cell phone during a conversation signals the importance of the discussion. And, tragically, individuals are feeling the need for communication so drastically that they are willing to risk their lives to drive while texting.

Mobile activities across domains inform the discussion but do not define it. While we can learn from what they have achieved, we need to abstract the principles and recontextualize them for the purposes of learning in higher education. We are seeking a path that uniquely characterizes what we can do in the academy to facilitate learning.

WHY HIGHER EDUCATION NEEDS TO PAY ATTENTION

Higher education does need to pay attention to the opportunities others are seizing and the societal changes that are occurring. Mobile devices are out there, and consequently they can be ignored to the instructor’s peril or capitalized on for the learner’s benefit. Students may be tweeting about the class, for instance, or in response to questions or issues in the class. They could be using their phones to send text messages or to answer questions posed by the instructor.

A number of years ago, I visited a higher learning institution that had installed high-tech classrooms. They had cameras, projectors, and wireless Internet. At the time, the faculty were asking that the Internet be disabled because they were afraid that the learners might be surfing or, of all horrors, day-trading. At the time, my thought was, “You can lead a learner to learning, but you can’t make them think” (paraphrasing Dorothy Parker); if you cut off the Internet, students could still play solitaire. If you took away the laptops, they could still doodle. In short, you cannot force learners to pay attention; they will vote with their eyeballs and ears, and you better have a compelling value proposition.

Today, things are even worse from this perspective. You can’t control learners’ mobile devices, which increasingly have internet access. There are two sides to the issue of internet access, as suggested already, but the increasing power of connectivity exacerbates the situation. On the negative side, learners not only can distract themselves but also can interact with others. With social networking tools like Twitter and Facebook, they can be having a side conversation, even about the subject matter and the instructor. This has already happened at a conference, where a speaker was pilloried by tweets from audience members and the awareness was shared broadly.

The upside, however, is worth considering. In Jane Bozarth’s (2010) prescient book *Social Media for Trainers*, she touts a wide variety of ways to use social media in the training room, and this extends to the classroom. Beyond social, further opportunities also exist to extend the university experience to enhance learning, student satisfaction, and of course those derivative outcomes: recruitment, retention, and completion. The opportunities include tools, content, interactions, and more.

The inherent nature of mobile devices has been quick and contextual access (Palm, 2003). This is changing with tablets supporting more prolonged experiences, and greater support for learning as opposed to information access. These are topics we will explore.

THE REST OF THIS BOOK

This book, as suggested, is about ways to use mobile to improve and optimize the learner experience. The mobile field is incredibly dynamic, as a new area tends to be. While some principles are emerging, the pragmatics change almost daily.

So, while I can talk about solutions, I can't talk about implementation in any meaningful way that won't be out of date before the book is available in print. As such, throughout the book I discuss principles and concepts rather than the specifics of implementation such as coding and tools. Where opportunities exist, I mention approaches to implementation, but that is not the focus. After all, if you get the design right, there are lots of ways to implement it; if you don't get the design right, it doesn't matter how you implement it.

Outline of What Is to Come

To truly capitalize on the opportunities for mobile devices to improve the learning experience, two essential background components are an understanding of mobile devices, covered in Chapter Two, and an understanding of good learning, discussed in Chapter Three.

From there, the components of the learning experience are broken down. Chapter Four considers the context of learning, including the institutional setting and administrative functions.

The various functions of learning are then examined in Chapter Five on content delivery, Chapter Six on the opportunities for interactive learning, and Chapter Seven on social learning.

Chapter Eight tackles topics that are on the horizon, including augmented and alternate reality, adaptive systems, and meta-learning. Chapter Nine looks at the organizational issues including platforms and policies before giving a call to action.

PRACTICE

1. Investigate the platforms currently in use on your campus: Which have mobile options already available? Are any enabled at your site?
2. What can you find out about your institution's population and their device profiles? Does this information already exist? How could it be collected?



Index

A

- Abilene Christian University, 45, 101, 102
- Accelerometers, 12, 13
- Access, to content, 56–58, 101
- Accreditation, 40
- Acronyms, 84
- Active learning, 28
- Adaptive experience: delivery of, 91–93; for navigable learning, 34, 35
- ADDIE model, 24
- Administrative tasks: custom apps for, 45–46; delivery of, 44–46; environmental scan of, 39–41; principles of, 41–44; technology-enabled student interactions for, 41–42
- Adobe: Flash performance and, 17; PDF format of, 59
- Advanced Audio Coding (AAC), 59
- Africa, 4
- Alternate pedagogies. *See specific types*
- Alternate realities, 89–91
- Alumni, 83
- Amazon Kindle, 59
- Android apps, 60
- App phones, 2
- App stores, 14–15
- Apple: format of content and, 59–60; history of mobile devices and, 7
- Application, of concepts: challenges in, 63–64; importance of, 63; in learning design, 24, 26; meaningfulness of, 64, 70; for problem solving, 26–27; in social learning, 79, 83
- Application programming interfaces (APIs): for context-specific content, 54; definition of, 13–14
- Appointments, 43
- Apps: for content delivery, 60; description of, 13–15; institution-developed types of, 45–46; organizational issues involving, 98; for portfolios, 73; for practice interactions, 66, 69; role of, in mobile learning, 21
- Assessments: location-specific, 71; policies regarding, 100; practice and, 64, 66–67, 68, 69, 72; principles of, 65; types of, 64
- Asynchronous interactions: definition of, 67; for social learning, 78
- Attention, of students, 58
- Audience response systems, 68
- Audio: to capture practice interactions, 72; content of, 58; for lecture format, 56–60; for performance support, 37; sharing of, 73
- Augmented realities, 87–89
- Ausubel, D. P., 33

B

Barnes & Noble Nook, 59
Barrows, H. S., 25, 34
Beever, G., 52, 60
Behavior, learner: adaptive delivery and, 92;
guidelines for, 79; policies related to, 100
Berg, R., 3
Biking rules, 43
Black, S. D., 78
Blackberry phone: history of, 7; learning management systems of, 45, 60
Blackboard: administration module of, 45; current status of, 60
Blogs, 68, 72, 82
Bloom, B. S., 27
Bloom's taxonomy, 27
Bluetooth, 16
Bozarth, J., 5, 83
Branching scenarios, 69–70
Breadcrumb trails, 67
Brown, J., 21
Brown, J. S., 25
Bruner, J. S., 24
Burns, K., 51
Business simulations, 70
Buttons, 11–12

C

Calculators, 14, 37
Calibre, 59
Cameras, 13, 64
Campus Computing, 2, 60
Capture: description of, 18; examples of, 42–43; importance of, 63; of mobile administrative tasks, 43; practice and, 72–73
Carey, D. O., 24
Carey, L., 24
Carroll, J. M., 96
Carter, D., 52
Cell phones, 1, 84
Channels, 44
Cheating, 64
Civil War (Burns), 51
Clarke, A. C., 3
The cloud, 15

Clues, location, 67
CNET, 41
Code division multiple access (CDMA), 16
Cognition and Technology Group at Vanderbilt, 32
Cognitive apprenticeship framework, 24–25
Cognitive capabilities, 20
Cognitive flexibility theory, 31
Collins, A., 25
Comic strips, 51, 53
Communication capability: as application, 14; description of, 19–20; examples of, 43; of mobile administrative tasks, 43; modes for, 80; for social learning, 78–80; textese in, 84; tools for, 77
Compass, 13
Competency-based performance, 27
Compliance reporting, 66
Compression, 57
Computers: daily use of, 21; students' perception of, 99–100; students' preference for mobile device over, 41; syncing mobile devices with, 15
Computing capabilities: description of, 18–19; examples of, 42; of mobile administrative tasks, 43; for performance support, 37
Conative learning, 32
Concepts: definition of, 30; diagrams for presentation of, 53; extension of, 65; media options for, 53; representations of, 31; rote versus models, 30–31
Consistency, 67
Constructivist theory, 24
Content: access to, 58–60; adaptive delivery of, 91–93; customization of, for mobile devices, 52–53; definition of, 49; description of, 17–18; for documents, 56–57; examples of, 42; hosting of, 60; instructional purposes of, 49; introduction to, 33; of media, 49–58; media options for, 54–58; mobile access of, 58–60; of mobile administrative tasks, 43; organizational issues related to, 96–98; sources of, 55–56; web 3.0 and, 91

Contexts: adaptive delivery and, 93; description of, 20; in learning design, 25; for media content, 50; in practice interactions, 71, 74; in social learning, 80–81; using examples to cover, 32

Convergent model, 8–9

Corporate sector, mobile devices in, 3–4

Coulson, R. L., 25

Criterion-referenced assessments, 65

Cross, J., 98

Custom applications, 15, 44

D

Darwin Integrate Topic Architecture (DITA), 57

Data collection, 43; for metrics, 100; practice interactions and, 71, 72–73; in social learning, 81; software for, 72–73

Data transmission, 101

Decision making, 31

Deep practice, 70

Deployment, 98

Designed instruction. *See* Learning design

Designing mLearning: Tapping into the Mobile Revolution for Organizational Performance (Quinn), 7

Desire2Learn, 45, 60

Diagrams: customization of, for mobile devices, 52–53; matching learning goals to, 51; in presentation of concepts, 53; versus text, 31

Dick, W., 24

Director's notes, 30

Disabilities, students with, 101

Disaster preparedness, 89

Discussion forums, 79

Distracted learners, 5

DITA (Darwin Integrate Topic Architecture), 57

DocBook standards, 57

Documents: accessible formats for, 59; definition of, 56; design principles of, 56–58; for performance support, 37

DoubleTake for Purdue, 73

Downloading content: compression and, 57; from iTunes, 60

DS (Dual Screen), 7–8

Dublin, L., 98

Duke University, 101, 102

Dyads, 79

Dynamic media, 58. *See also specific types*

E

Earphones, 11

eCollege, 45

Economic issues, 40

Editing, of social media, 82

802.11x standard, 16

Eisenberg, M., 3

eLearning Guild, 21

E-mail, 68, 72, 79

Emergency notifications, 42, 89

Emergency training exercises, 89

Emergent goals, 28

Emotion, in learning experience, 33, 53

Empowerment, 4

Endeavour College, 52

Engagement, learner, 27–28

Engaging Learning: Designing e-Learning Simulation Games (Quinn), 28

Environmental scans, 39–41

ePortfolio for iPhone app, 73

E-Pub format, 59

E-Readers, 59

Ethics, 100–101

Etiquette, mobile, 84

Examples: audio/video presentation of, 58; description of, 31–32; in documents, 57; in introductions to concepts, 33; media for, 53, 57, 58

Expectations, setting, 33

eXtensible Markup Language (XML), 57

Extension, of learning: data collection and, 73; practice and, 65

F

FaceTime, 14

Face-to-face interactions, 67

Faculty: evaluation of practice by, 66; motivation of, 102–103; organizational issues involving, 96–103; response of, to Internet in classroom, 5; role of, in social learning, 35

Failure, importance of, 24

Farmers, 4
 Feedable social media, 81
 Feedback, in practice activities, 28, 71, 72
 Feltovich, P. J., 25
 Files, 49. *See also specific types*
 Financial aid, 42
 Fixed buttons, 11–12
 Flash technology, 17
 Flight checklists, 54
 Flood simulation, 89
 Fonts, 57
 Formative assessments, 64

G

Game Boy, 7–8
 Games: alternate reality types of, 90–91; for practice interactions, 69, 70; usability goals of, 96
 Gery, G., 36
 Gick, M. L., 31
 Global position systems (GPS): as augmented reality, 87–88; for context-specific content, 54; description of, 12–13
 Global system for mobile (GSM), 16
 Goals: of learning, 50; of simulation activities, 28, 29
 Google, 44–45
 Google Docs, 77
 Governance, 102
 Grammar, 66–67
 Grant, W., 3
 Granularity, 57, 91
 Graphic novels, 51
 Graphics, 50, 51
 Graphing calculators, 37
 Group work, in social learning, 79, 80, 81, 83
 GSM. *See* Global system for mobile

H

Haptic mechanisms, 10, 11
 Hardware, 98
 Hash tags, 68, 80
 Health information, 4
 Higher education: adaptation of mobile learning by, 2; custom applications created by, 45–46;

infrastructure of, 45; mobile-accessible web sites for, 41; response to mobile learning by, 4–5; traditional aim of, 3
 Hincke, M., 71
 Holeton, R., 3
 Holum, A., 25
 Holyoak, K. J., 31
 Hosting content, 60
 HTML, 17, 57

I

IM (instant messaging), 82
 Images, compression of, 57
 Inert knowledge, 26
 Information architecture, 67
 Information literacy, 56
 Information sharing: for administrative tasks, 42, 43; barriers to, 16; benefits of mobile devices regarding, 10
 Information storage, 15
 Information technology (IT) departments, 44–46
 Infrared Data Association (IrDA), 16
 Infrared technology, 16
 Input, 11–12
 Instant messaging (IM), 82
 Institution-specified devices, 101–102
 Instructional developers, 98
 Intellectricity, 92
 Intelligent Tutoring System (ITS) approach, 92
 Interaction design: for administrative tasks, 41–42; for practice, 63–73; principles of, 41–44, 66
 Interfaces, 11, 66. *See also specific interfaces*
 International Telecommunications Union (ITU), 1
 Internet: access to, 2, 5; storage on, 15
 Introduction, to learning: components of, 24; description of, 33, 53; in learning design, 24; media for, 53, 56
 Introspection, 27
 Inventory, 13
 iOS apps, 60
 Ip, A., 81

iPad: growing popularity of, 8; institution-provided, 102; performance support media for, 54; students' preference for, 41
iPhone, 73
iPod: access to content through, 59; history of, 7; input devices of, 12; institution provided, 101
IrDA (Infrared Data Association), 16
IT departments. *See* Information technology departments
ITS (Intelligent Tutoring System) approach, 92
Ittelson, J., 3, 72–73
ITU (International Telecommunications Union), 1
iTunes University, 46, 59

J

Jacobsen, M. J., 25
Jalali, A., 71
Jog dials, 12
Journaling, 65

K

Keller, J., 25, 102
Keyboards, 12
Keypads, 12
Kindle e-reader, 59
Knowledge application. *See* Application, of concepts
Knowledge objectives, 26
K–12 education, 4
Kukulaska-Hulme, A., 44

L

Language, of texting, 84
LANs (local area networks), 15–16
Laptop computers, 8, 41
Larkin, J. H., 31
Laurillard, D., 35
Layer, 89
Learner–instructor interactions. *See* Social interactions
Learning: in classrooms versus on mobile devices, 3; goals of, 50, 93–94; importance of understanding, 23; to learn, 33, 36; locus of control

for, 96–97; stages of, 23; traditional order of, 34

Learning design: adaptive delivery in, 91–93; alternate pedagogies in, 33–37; characteristics of, 24–25; concepts in, 30–31; of documents, 56–58; of dynamic content, 58; examples in, 31–32; goal of, 25, 26; introductions in, 33; linear model for, 26–33; media for, 56–68; objectives in, 26–27; organizational issues related to, 95–96; for practice, 63–67; practice in, 27–30; principles of, 41–44; question design in, 69; summaries in, 32

Learning management systems (LMSs): for hosting of content, 60; infrastructure and, 45; organizational issues involving, 97–98; for practice interactions, 66, 69

Learning Studio, 45

Least assistance principle, 96

Lectures: etiquette and, 84; format of, 59–60; media delivery of, 51–52, 59–60

Legal issues, 40

Leigh, E., 81

Levin, J. A., 78

Libraries, 42, 43

Lights, 11

Linear model, for learning, 26–33

Linkable social media, 81

Literacy, new types of, 36

Local area networks (LANs), 15–16

Location clues, 67

Location-specific learning: alternate reality in, 89–91; augmented reality in, 87–89; in practice interactions, 71; in social learning, 80–81, 82

Locus of control, 96–97

Long, P. D., 3

M

Mager, R., 27

Manga, 51

Mapping concepts, 31–32

Maps, 43, 54–55

Marketplace, mobile technology, 2

Massachusetts Institute of Technology, 41

Massed practice, 29

Mathematics examples, 32
mCommerce, 16
Meaningful tasks, 64
Media: capture of, 14; content for, 49–58; definition of, 49; information literacy related to, 56; match of learning goal to, 50; mobile access to, 58–60; repositories for, 82; for social learning, 82; viewers for, 14
Medical information, 13, 54
Meetings, 88
Mehan, H., 78
Memorization, 64, 70
Mentors, 28
Message systems, 50
Meta-learning, 33; description of, 36; drawbacks associated with, 55–56; practice and, 73–74; simulations and, 74; in social learning, 83–84
Metcalf, D., 21
Metcalf, D. S., 67
Metrics, 96, 100
Microblogging, 77, 82
Microphones, 13
Microsoft products, 7, 59
Mills, M., 3
Minimalism, 66
Mistakes, demonstration of, 32
mLearning (Metcalf), 67
Mobile devices: capabilities of, 17–20; daily use of, 21; definition of, 10; description of, 8–17; goal of, 10; history of, 7–8; increase use of, 3–4; institution- versus student-provided, 101–102; options for, 97–98; organizational issues related to, 97–98; platforms for, 17; principles for use of, 41–44; shared information among, 10; students' adeptness at using, 56; synching of, with desktop computers, 15; variables of, 10–17. *See also specific devices*
Mobile domain, 41
Mobile Learn platform, 60
Mobile learning: versus classroom learning, 3; definition of, 21; goal of, 93–94; higher education's adaptation of, 2
Mobile Learning: A Handbook for Educators and Trainers (Kukulska-Hulme & Traxler), 44

The Mobile Learning Edge: Tools and Technologies for Developing Your Teams (Woodill), 7
Mobile Learning Research Report (Wexler et al.), 21
Mobile networks, 1
Mobile-accessible sites, 41
MobileOxford project, 45–46
Model-based reasoning, 70
Models: application of, 70; retention of, 30–31
Moodle, 60
Motivated learners, 33
Motorola, 13
MP4 format, 59
mtd.mobi, 41
Multiple-choice questions, 69
Multitasking, 36
Museum of London, 54, 88

N

Navigable learning: description of, 34–35; for practice interactions, 67
Near-field communication, 16
Negotiation: augmented reality in, 88; practice of, 68–69; of shared understanding, 35
Networking technologies, 15–17
News, campus, 43
Nielsen, J., 8, 52
Nintendo, 7–8
Nook e-reader, 59
Normative assessments, 65
Novelty, in practice activities, 28
Numeric keypads, 12

O

Objectives: description of, 26–27; format of, 27; matching media to, 50
Office hours, 79–80
Office, Microsoft, 59
Ohio State University, 41
Oklahoma University, 41
OnDevice, 2
Online Role-Playing Games (Wills, Leigh, & Ip), 90
Open Education, 56
Operating systems, 2

Organizational change, 98
Organizational issues, 95–102
Output: goal of, 10; organizational issues involving, 98; types of, 10–11

P

Palm, 2, 5, 7, 21, 46
Palm Pilot, 96
PANs (personal area networks), 15–16
Parallel conversations, 80
Parker, D., 5
Parking rules, 43
Parry, D., 36
Participation, of students, 79, 84
Participatory design, 96
Patching models, 31
Path to Enlightenment, 46
PDA: apps of, 14; history of, 7; sensors of, 13; touch screens of, 11
PDF format, 59
Pearson, 45
PeopleSoft, 45
Performance support: categories of, 37; delivery of, 44–46; description of, 36; design issues to consider in, 46; media options for, 54–55; principles of, 41–44. *See also specific types of support*
Personal area networks (PANs), 15–16
Personal information management (PIM), 14
Personalization: adaptive delivery and, 92–93; definition of, 64–65
Pew Internet, 1
Photos, 50, 51
Pilots, 99
Planners, 37
Platforms, 8, 67
Playback, of media, 58
PlayStation Portable (PSP), 8
Pogue, D., 2
Policies, organizational, 84, 100–102
Polls, 68
Portfolios, 72, 73
Practice, opportunities for: aligning engaging experiences with, 28–29; challenges in, 63–64;

description of, 27–28; design of, 63–67; feedback on, 28, 71; goal of, 93–94; importance of, 63; interaction tools for, 67–73; in learning design, 25; media for, 57; meta-learning and, 73–74; organizational issues related to, 96–102; scaffolding and, 29; spacing of, 29, 30; subject matter experts and, 29

Prior knowledge, 33

Problem solving: application of knowledge in, 26–27, 63; challenges in, 63–64; conceptual representations in, 31; subject matter experts in, 29

Problem-based learning, 34

Processing, 64–65

Productivity improvement, 3–4, 21

Productivity tools, 14

Products, of learner activities, 30

Projection, 11

PSP (PlayStation Portable), 8

Pull approaches, 57

Push approaches, 57

Puzzles, solving, 55

Q

Qualitative models, 31

Quantitative models, 31

Questioning: for practice interactions, 68, 69; in social learning, 80

Quick-response (QR) codes, 54

Quinn, C., 21

Quinn, C. N., 7, 17, 23, 28, 57, 65, 77, 78, 88, 96

Quizzes, 67, 68, 69

R

Radio frequency identification (RFID), 13

Reasoning models, 31

Red 7, 46, 90

References, use of, 64

Reflection: instructor's role in, 35; on practice interactions, 72; in social learning, 79

Registering, for classes, 42

Reigeluth, C., 25

Reliable misconceptions, 29

Reporting, compliance, 66

Resnick, M., 3

- Retention: assessments and, 65; as goal of learning, 26; of models, 30–31; practice and, 29, 65, 71; of rote learning, 30
- RFID (radio frequency identification), 13
- Role plays: of alternate realities, 90; in practice interactions, 68–69, 71; in social learning, 80–81
- Roschelle, J., 3
- Rossett, A., 37
- Rote learning, 30, 31
- Round wheels, 12
- ## S
- Sakai, 60
- Sales-training games, 90
- Sarducci, G., 3
- Scaffolding: definition of, 29; performance support for, 36; in practice, 29
- Scavenger hunts, 46, 55
- Scenarios, 69–70
- Schedules, 43
- Schlenker, B., 21, 81
- Schoenfeld, A. H., 32
- Screens, 10–11, 66
- Searchable social media, 81
- Security: policies related to, 100–101; in social learning, 83
- Self-efficiency, 41
- Self-evaluations, 72
- Selker, T., 11
- Sensors, 12–13
- Server-side processing, 70
- Seton Hall, 101
- Shafer, L., 37
- Shepherd, J., 90
- Shopping, 4, 43
- Shorthand, 84
- Sigil editor, 59
- SIM (subscriber identify module) cards, 16
- Simon, H. A., 31
- Simple messaging system (SMS). *See* Text messaging
- Simulations: definition of, 69; meta-learning and, 74; for practice, 28–29, 69–70, 71; in social learning, 80–81
- Sizes, screen, 66
- Skype, 14, 82
- Slide shows, 53, 57
- Slow learning, 93–94
- Smartphones: access to content through, 59; benefits of, 10; history of, 7–8; lectures and textbooks delivered via, 52; sales of, 8
- SMS. *See* Text messaging
- Social interactions, 78, 82–83
- Social learning: advantages of, 35; communication in, 78–80; contexts in, 80–81; data collection in, 81; importance of, 24, 77; integrated networks in, 82; key to, 79; knowledge application in, 83; media for, 82; meta-learning in, 83–84; parallel conversations in, 80; policies for, 84; powerful element in, 78–79; public versus proprietary tools for, 82–83; reflection in, 79; role of instructor in, 35; social media for, 81–83; synchronous versus asynchronous communication in, 78; writing in, 84
- Social media, 81–82. *See also specific types*
- Social Media for Trainers* (Bozarth), 5, 83
- Social networking: communication apps for, 14; pros and cons of, 5; for social learning, 82; tools for, 77
- Soft buttons, 11
- Software: for data collection, 72–73; for social interactions, 78
- Soloway, E., 3
- Sony, 8
- Spaced learning, 53–54
- Speakers, 11
- Spiro, R. J., 25, 31
- Spohrer, J., 89
- Stanford University, 46, 102
- Static text, 56. *See also specific types*
- Stein, F., 25
- Stories: branching scenarios in, 69–70; for examples, 32; in practice activities, 28, 68–70; using audio/video to communicate, 58
- The Street, 1
- Student information systems, 45
- Study groups, 83
- Stylus, 11

Subject matter experts: demonstrations of, 32;
knowledge versus application for, 27; mis-
takes of, 32; practice and, 29

Subscriber identify module (SIM) cards, 16

Sugrue, B., 26–27

Summaries, 25, 32

Summative assessments, 64

SunGard, 45

Synchronous interactions: definition of, 67; in
office hours, 79–80; for social learning, 78

System-generated content, 91

T

Tablets: access to content through, 59; capabili-
ties of, 8; versus laptops, 8; lectures and text-
books delivered via, 52; for location-specific
assessments, 71; matching learning goal to,
51

Tagging information: for context-specific con-
tent, 54; in documents, 57; in social media,
82

Task completion, 78

Technology: barriers to, 39–40; as catalyst for
changes in learning, 3; current policies related
to, 100–101; delivery methods for, 44–46;
meaningful tasks using, 64; for mobile learn-
ing delivery, 44–46; organizational issues
involving, 97–98

Templates, 57

Text messaging: for emergency notifications,
42; language of, 84; mainstream nature of,
44; for media content, 50; opportunities for
interaction via, 2; phone services and, 16; for
practice interactions, 68

Text models, 31

Textbooks: customization of, for mobile devices,
52–53; e-readers for, 59; mobile delivery of,
51–52, 59

Textese, 84

Thalheimer, W., 29

Thor, E., 21

3GP format, 59

Time, augmented, 88

Timed interactions, 67

Tinker, R., 3

Touch screens, 8, 11

Track wheels, 12

Trackballs, 12

Training courses, 83, 90

Transcripts, 42

Transfer, of knowledge: alternate reality and, 89;
as goal of learning, 26; practice and, 65

Transit routes, 43

Traxler, J., 44

Tremblay, M., 71

Triangulation, 100

Trottier, D., 71

TUAW, 8

Tunes, 69

Twitter, 77, 80, 82

U

Universal serial bus (USB) devices, 15

University of Aberdeen, 70, 89, 91

University of Minnesota, 73

Usability goals, 96

User testing, 67

V

Van Barneveld, A., 21

Van Merriënboer, J.J.G., 25

VanLehn, K., 29

Vibration, 11

Video: to capture practice interactions, 72; in
concept presentations, 53; content of, 58;
customization of, for mobile devices, 52–53;
for lecture format, 59–60; matching learning
goal to, 50, 51; for performance support, 37;
sharing of, 73

Video chatting, 14

Vincent, A., 90

Virginia Tech, 41

Virtual classrooms, 78

Virtual worlds, 88–89

Vision, 98–100

Visual data encoding, 13

Visual media. *See specific types*

Voice, 50

Voice menus, 44

Voice over Internet Protocol (VoIP): description
of, 16; for social learning, 82; tablet
capabilities for, 8
Voice recognition, 12
Vygotsky, L. S., 24

W

Wagner, E., 21
Walmart, 13
WANs (wide area networks), 15–16
Web Accessibility Initiative, 101
Web browsing, 14
Web forms, 44, 69
Web pages, 56–57
Web portals, 60
Web sites: generation of, 91, 92; mobile-accessible
versions of, 41; resized pages on, 56–57
Web 3.0, 91
Wexler, S., 21
Whitehead, A. N., 26
Wide area networks (WANs), 15–16
Wi-fi, 16

Wiki tools, 77, 82
Wills, S., 81, 90
Windows Mobile software, 7
Wireless networking technologies, 15–16
Woodill, G., 7
“World in 2010” (International
Telecommunications Union), 1
World Wide Web Consortium, 101
WorldBoard, 89
Writing: to capture learning, 72; of practice
interactions, 66–67; resizing of, 56–57; in
social learning, 84

X

XML (eXtensible Markup Language), 57, 59
Xoom device, 13

Y

YouTube, 73

Z

Zen of Palm, 96

