Handbook of Blended Learning: Global Perspectives, Local Designs

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SECTION 1: INTRODUCTION TO BLENDED LEARNING

As blended learning emerges as perhaps the most prominent delivery mechanism in higher education, business, government, and military setting, it is vital to define it as well as explain where it is useful and why it is important. This section, with chapters from Charles Graham, Elliott Masie, Jennifer Hoffman, and Ellen Wagner, does just that. These authors discuss the elements that are important to consider in blended learning while also touching on some of the emerging trends and issues.

In the first chapter, Charles Graham describes the historical emergence of blended learning as the convergence between traditional face-to-face learning environments and computer-mediated (or distributed) learning environments. He discusses four critical dimensions to interactions that occur in both of these environments (space, time, fidelity, and humanness) and presents a working definition for blended learning systems. This chapter also addresses current trends seen in both corporate and higher education including blends that focus on: (1) *enabling* access and flexibility, (2) *enhancing* current teaching and learning practices, and (3) *transforming* the way individuals learn. The chapter ends with six important issues relevant to the design of blended learning systems followed by some directions for the future.

In the second chapter, Elliott Masie presents a brief and provocative perspective on blended learning. The central theme of his chapter on "The Blended Learning Imperative" is that all great learning is blended. In the pre-digital age, combinations of different learning contexts were used. Similarly, in the 21st century, learning environments will increasingly incorporate "e elements" (from e-learning) into varied

instructional contexts. Seven compelling reasons are outlined for why blending has been popular historically and will continue to be so.

In the third chapter of this section, Jennifer Hoffman of InSync Training addresses several of the typical challenges being faced by those attempting to implement blended solutions. She notes that some of the common mistakes made by designers include: (1) assuming that it will take less time to re-design an existing program than it would to design a blended program from scratch; (2) putting too much emphasis on the "live" components of a training situation; and (3) assuming that traditional facilitators are the best choices for managing a blended version of the training. An emphasis is placed on the importance of training the design team as well as the trainers. In addition, an example of a blended train-the-trainer course is outlined.

In the fourth chapter of this section, Ellen Wagner of Macromedia shares a vision for the next generation of blended learning. She addresses the impact that personal and mobile devices are likely to have on emerging models of blended learning and suggests that interaction strategies offer a useful means for enhancing individualization, personalization, and relevancy. She discusses current models of interaction and shares eleven ways that interaction can be used to focus on performance outcomes.

SECTION 2: CORPORATE BLENDED LEARNING MODELS

This handbook is filled with numerous stories, examples, and models related to blended environments. The second section of the handbook showcases blended learning models and frameworks of six major corporations— IBM, Sun Microsystems, Microsoft, Avaya, Cisco, and Oracle. Several of these models have some commonalties such as the front-end assessment of learners, the choices between independent-study and facilitated learning paths, the development of communities of interest or communities of learning, and the alternation and variation of delivery mechanisms. In addition, each model offers insight into online course structuring, cost savings, and learning delivery efficiency, while also lending support to organizational efforts in knowledge management. These are comprehensive models which move beyond one dimension or focus to the consideration of a learning ecology as noted in the chapter from Sun Microsystems. Finally, embedded in some of these chapters are unique partnerships and growth opportunities for blended learning.

In the first chapter in this section, Lewis and Orton share IBM's blended 4-tier learning model consisting of: (1) information and just-in-time performance support, (2) interactive online learning, (3) online collaboration, and (4) classroom learning labs. Each tier in the model meets a unique learning or performance need. The chapter then describes how the model is implemented in the year-long "Basic Blue for Managers" program. In the first phase of this program, new managers take part in 48 hours of self-paced learning for the first twenty-six weeks of training. During this time, learners also receive online coaching and support for the selection of their learning paths and completion of workplace activities. Phase II of the program consists of a 5 day in-class

learning lab that focuses on experiential, higher-order learning. In the third and final phase of the program, managers create an individualized development plan for the concluding 25 weeks of online learning. The third phase also emphasizes peer coaching and transfer of knowledge to the workplace setting. After describing IBM's model and a program where the model was implemented, the authors share their strategy for evaluating the effectiveness of the program which projected a return on investment of 47 to 1.

In the second chapter of this section, Wenger and Ferguson promote an ecology framework for guiding blended learning solutions that has been developed at Sun Microsystems. This model was designed to overcome some of the inherent limitations in classifying instruction based on modalities (e.g., classroom training versus e-learning). Their ecology framework focuses on four means or ways of experiencing different instructional elements: (1) studying, (2) practicing, (3) teaching, and (4) coaching. These four categories make up the quadrants of a matrix with two dimensions: (1) the first dimension (x axis) ranging from a focus on content delivery to experience and practice, and (2) the second dimension (y axis) ranging from self navigation to guided navigation. Specific instructional elements for each category are shared. A second evolution of the learning ecology matrix is also articulated. Importantly, the second version incorporates the concept of knowledge management into the matrix. This "Knowledge Ecology Matrix" changes the dimensions ranging along the x-axis to collecting content (explicit knowledge) on the one end to connecting people (tacit knowledge) on the other.

The third chapter of this section from Ziob and Mosher outlines a strategy and several case histories of Microsoft Learning's approach to blended learning. The authors

emphasize that one of the drivers for blended learning is the ability to provide "solutions" to customers' problems, rather than just training and this requires a highly flexible approach. Three major forms of learning to be blended are outlined: (1) live, (2) instructor led training, and (3) self-paced learning, as well as the tools for supporting learning communities (e.g., peer-to-peer learning). Three diverse cases are described involving finding learning solutions for the State of Wisconsin, a Philippine apparel supply chain, and Microsoft de Argentina. In all cases, blended solutions were introduced which resulted in time and cost savings to the customers.

The fourth chapter of this section by Chute, Williams, and Handcock highlights two cases of blended learning that have been implemented at Avaya. In the first case, Avaya enhanced the value and use of the knowledge assets available through the company knowledge management system by beginning a weekly live audio and Internet teleconference seminar series. In this program, live knowledge sharing was emphasized as authors highlighted knowledge assets in the system and interacted with the audience about the assets. In the second case, Avaya developed an Executive Solutions Selling Business Acumen (ESSba) training that spanned a 2 ½ month period and resulted in $36.3M in incremental revenue in the first six months following the program. The training involved early teleconferences and online training modules followed by two different weeklong F2F seminars and mentoring as the participants attempted to incorporate what they learned into their business practices.

The final chapter by Alan Dennis, Barbara Bichelmeyer and their colleagues at Indiana University is about blended learning at Cisco Systems. This research team outlines the blended approach used by the Cisco Networking Academy (CNA), a global

program in all 50 of the United States and more than 150 countries across the globe. The CNA program is designed to provide technical knowledge and training for the information technology industry. Importantly, the authors point to several critical dimensions in which to compare online and F2F instruction, including: synchronicity versus asynchronicity, consistency versus variability of content, and standardization versus individualization of course activities. The blended approach used by the CNA courses is based on: (1) a centralized curriculum development, (2) online content delivery, (3) onsite implementation (and individualization) of instruction, and (4) standardized assessment of learners.

The final chapter in this section by Kirsten Hanson and Frankie Clem introduces Oracle's experimentation with a blended approach in their leadership training. Managers were given the opportunity to participate in a leadership track that was completely instructor led training (ILT) or a track that took a blended learning (BL) approach by adding virtual synchronous and asynchronous activities before and after the F2F sessions. Some exploratory research was conducted with the participants that found similar degrees of content retention between the ILT and BL groups but uncovered higher degrees of perceived benefits and an enhanced sense of community among the BL participants. Additional issues of interest related to community development are raised for further investigation such as the predominant learner use of the community for task oriented rather than social reasons and learners placing greater levels of importance on the "high touch" elements of the training.

SECTION 3: HIGHER EDUCATION BLENDED LEARNING MODELS AND PERSPECTIVES

Of course, the blended learning models, stories, and examples are just as rich and important in higher education as they were in the previous section on corporate models. This third section contains higher education models for blended learning from universities in New Zealand and Wales, as well as two in the United States. In addition, officers of a popular course management system, WebCT, provide examples of how some of their customers are blending their online learning environments. These five perspectives or models should offer assistance in regards to strategic planning, training, grant writing, and evaluation related to blended learning. Perhaps most importantly, colleges and universities might attempt to compare their in-house blended designs to one or more of the models presented here.

In the first chapter of Section 3 of this handbook, Barbara Ross and Karen Gage delineate three types or "flavors" of blending that they have extrapolated from trends seen among the broad range of WebCT users. The first is technology-enhanced courses where technology is used as a supplement to traditional course practices. The second is reduced face-time courses which are courses that replace some of the traditional F2F lecture time with computer-mediated activities. The third is blended programs in which students can choose to take a mix of both traditional F2F and completely online courses. Example vignettes from each of these cases are presented. Some benefits to blending are presented such as expanding access, improving quality, serving diverse student populations, reducing time to graduation, addressing student desire for technology in education, and greater insight and tracking of student progress. Finally, several

institutional strategies for implementing blended learning are shared along with case vignettes of institution wide adoption of technology as well as multi-institutional collaborations in blending. The authors feel that the trend towards blending is so prevalent that eventually we will not be asking *whether* institutions are blending but *how* they are blending.

The second chapter highlights three different categories of blending seen at the University of Waikato in New Zealand. It details the history of blended learning at an institutional level and then talks about blends at both course and program levels. Four categories of blends are outlined: *Fully, Mostly, Somewhat, and Supported Online*. These four are outlined and three case studies are provided. The first blend relates to Waikato's Law Diploma program which is mostly online. In fact, only about 15 percent of learning time in this program involves F2F contact with the remaining time entailing interaction with both materials and people through asynchronous discussion forums. The second case study, which was also classified as mostly online, is of a program for licensing teachers. In this case, teachers would teach one day a week at their rural schools and participate at a distance in the more theoretical aspects of their learning. They were required to attend three weeks of residential campus F2F learning annually. The last case was graduate program for secondary teaching that was classified as somewhat online. This one year program was conducted mostly F2F with some online components related to ICT and online contact with peers during their practicum experience. Finally, the chapter talks about some basic strategies for supporting blended learning.

In the third chapter of this section, Norah Jones reviews various research literature indicating that blending can improve learning and that also shows how widely blended

solutions are being adopted and discussed. She acknowledges that we may be behind the curve in terms of the amount of research performed thus far on blended learning environments. She follows that remark up with a cautionary note that people are using all kinds of definitions of blended learning which make it difficult to understand what is really being researched and promoted. She then shares the technology integration continuum that is used at the University of Glamorgan in Wales. This continuum includes Basic ICT usage stage (PowerPoint, Word, etc.), E-enhanced stage (use of LMS for productivity and communication), E-focused stage (use of discussion boards, interactive materials, online assessments, etc.), and E-intensive stage (predominantly online courses with minimal F2F time for inductions, briefings, etc.). She shares a case study in which a curriculum was developed and delivered at a distance and the learners requested more blended experiences. In response, the University of Glamorgan went through the process of incorporating more F2F contact for the student socialization.

In the fourth chapter of this section, Chuck Dziuban and his colleagues at the University of Central Florida (UCF), a place which is known for thoughtful training in the area of online learning and innovation in blended learning, describe the dramatic increase in demand for blended courses that they have witnessed and encouraged. Blended courses at UCF have grown from 8 courses with 125 students in 1997 to 508 courses with 13,600 students in 2003-2004. The UCF approach to blending replaces some F2F class time with online activities. Potential benefits outlined in this chapter range from improved learning effectiveness and satisfaction to cost-reductions for physical infrastructure. At UCF, the cost reduction due to scheduling efficiencies has not materialized as of yet. Measurements of success rates over three years (as measured by

the number of A-C passing grades and withdrawal rates) have shown that the blended approach on the whole is slightly better than the F2F only and online only modalities. The chapter also provides data on student satisfaction with their blended courses as well as information on the quantity and quality of student interactions in UCF courses.

In the final chapter, Reynolds and Greiner describe National University's online programs with an emphasis on the fast-growing online teacher education program. This program has no on-site meeting requirements with program faculty. Instead, faculty and peer interactions are carried out through the use of asynchronous discussions and other tools in a computer-mediated environment, though the experience is generally less collaborative than a traditional F2F experience. To become a certified teacher in the State of California, National University students must have several in-school field experiences. The blending in this entirely online program occurs as the preservice teachers participate in F2F field experiences in schools within their respective geographic locations. These F2F field experiences are coordinated by a state coordinator as well as local field experience coordinators of National University.

SECTION 4: FOR-PROFIT AND ONLINE UNIVERSITY PERSPECTIVES

One field that has received enormous attention recently is the for-profit university. There is much controversy about the emergence of for-profit universities, especially those that address online environments. This section of the Handbook of Blended Learning (HOBLe) includes chapters from high level executives of three well known for-profit universities—the University of Phoenix, Capella University, and Jones International University. These authors make interesting predictions as to where blended learning can play a significant role in for-profit higher education enterprises.

Brian Linquist, Dean of the College of Graduate Business and Management and Associate Vice President of Academic Affairs for the University of Phoenix (UoP), discusses three different modes of learning that the UoP provides for its students: traditional F2F, completely online, and blended. All of the courses at the UoP last for five weeks. Blended courses come in two flavors in order to meet the needs of both local and more distant students. For the local option, learners attend a four hour face-to-face (F2F) session for the first and fifth weeks of class while the middle weeks are completely online. For the distance option, the learners attend a two hour F2F session at the beginning and a two hour F2F session at the end with weeks 1-4 being online (the intro session is intended to be directly after the ending session of the previous term's course so as to require only one trip). The UoP has seen an approximate doubling of its enrollments in the blended option each year since it's inception in 2000; however, this option still only accounts for about 4 percent of their enrollments. Competency requirements are the same for classes taught in each of the modalities. Nevertheless, it is felt that the online portions advantage student reflective thinking, while the F2F portions

advantage student socialization and project presenting skills. In this chapter, Lindquist also discusses the efforts that UoP undertakes to train faculty to have the requisite skills to facilitate online and traditional teaching.

This chapter describes Capella University's approach to online and blended learning. In this chapter, Mike Offerman and Christopher Tassava note that Capella provides completely online learning opportunities for adult learners. Students enrolled in doctoral and some master's programs at Capella have residency requirements which are the extent of the F2F blending that occurs at this university. The residency requirements for graduate students at Capella fill a largely social role in facilitating community, selecting a mentor, and understanding expectations. Capella takes the opposite approach to traditional universities--instead of asking how online might supplement F2F instruction, they begin with the assumption that most learning can take place online and F2F becomes a supplement to the online learning experience. In effect, this chapter calls into question assumptions that the traditional model or a blended model that still has roots in a traditional delivery of instruction model is more effective than a completely online model for the kind of independent adult learners who tend to choose, and, hence, need Capella University.

In the third and final chapter of this section, Pam Pease, former President of Jones International University (JIU), documents the birth and history of JIU and many of the decisions that helped this organization develop a completely virtual model of higher education. The virtual only model of JIU is detailed and compared with models of other for-profit universities that blend F2F, site-based learning with online learning. Several

issues and challenges faced by virtual only institutions are discussed such as quality versus cost, hybrid versus virtual, not-for-profit versus for-profit competition, etc.

SECTION 5: CASES OF BLENDED LEARNING IN HIGHER EDUCATION FROM AROUND THE WORLD

This handbook contains examples of blended learning from all around the globe. This section in particular highlights cases from twelve different countries: Japan, Korea, China, Malaysia, Singapore, Australia, Canada, U.S.A, Mexico, Israel, the United Kingdom, and South Africa. In addition to the specific examples of blended learning from these twelve countries, other sections of the handbook contain perspectives on blended learning from countries such as Jordan and Rwanda (see Selinger this volume), New Zealand (see Wright et al. this volume), and Wales (see Jones this volume). These cases show a rich variety of ways that blending can be implemented to address the learning needs of diverse environments and cultures around the world.

Japan - Jung and Suzuki focus on blended learning environments in a Japanese higher education context. These authors describe Japan's slow emergence into the distance learning realm. They provide a framework that helps them analyze the types of blending prevalent in Japan. This framework includes blending to support information dissemination, blending to support open interaction, blending to support knowledge creation, and blending to support efficient management. In all of these cases, the paradigm incorporates ICT into a traditional face-to-face (F2F) context. Under knowledge creation, the use of distance experts as instructors is mentioned since it would not be practical to always bring experts into the F2F context. Explanations and cases describing the other areas are included. Blending is also discussed at a program level with some F2F courses required and the rest allowed at a distance.

Korea - Not far from Japan, Lee and Im share their perspectives on the growing popularity of blended learning in the Korean

lectures for 7 out of 18 weeks while collaborative e-learning activities account for the remaining weeks.

Malaysia - Next, Kaur and Ahmed showcase a model of blended learning that is used by the recently established Open University Malaysia (OUM). In this model, learning experiences are offered through: (1) self-managed learning, (2) F2F learning, and (3) online (virtual classroom) learning. Self-managed learning (using print materials) is the most dominant element in the model, accounting for approximately 70 percent of the expected 40 hours of learning time per course credit. OUM learners also have the option of meeting in-class with a tutor and other students five times in a fifteen week semester. Increasingly, the self-managed and F2F components of the learning experience are being supported by online discussions and interactions with online digital learning objects. The chapter is summed up with ten major challenges currently faced by the OUM including issues such as sustainability, pedagogical effectiveness, efficiency, and the democratization of education.

Singapore and Australia - The chapter, by Lefoe and Hedberg, provides examples of blending in two very different contexts, Wollongong, Australia and Singapore. In the Wollongong case, the need for blending stemmed from the expansion of the university to satellite campuses where students were physically separated from core university facilities. The Singaporean case, on the other hand, was an example of blending that was intended for the convenience of the learners as well as to bring in expert instructors who were separated by distance from the learners in Singapore (i.e., local students and tutors with expert instructors at a distance). Several important issues are raised by the paper, including: (1) the movement towards student-centered approaches

with blending; (2) the changing roles and responsibilities of students, instructors, and support personnel; (3) the need for better support for the online portion of learning; and (4) the perceived increase in workloads for instructors and students.

Canada - The next chapter in the section, from Owston, Garrison, and Cook, is a massive study of blended learning in eight different courses across universities in Canada that were part of the Cohere network. In addition to the eight specific case descriptions, basic data from a survey given to the students in the eight courses is reviewed. While instructors and students seemed generally satisfied with their blended experiences, some of the issues that were raised in this study included: the link between interaction and level of satisfaction with the blended course, increased time required by students and instructors, and lack of support by peers and institutional policies. In addition, Owston et al. raise issues related to the usability of online discussions in large enrollment courses as well as the fact that students appreciated traditional course experiences such as F2F discussions.

Mexico - The next chapter in this section describes the progress being made in Mexico's educational system to use technological tools to support teaching and learning. A history of educational technology usage in Mexico, including satellite television and the recent emergence of Internet learning, is highlighted. Among the key programs described in this chapter is the Red Escolar program which provides web resources to k-12 schools across Mexico. Also detailed here are efforts to expand the Mexican Virtual University. Issues are discussed related to the choice and use of a learning management system as well as changing faculty and student roles in a blended environment.

U.S.A. - In this chapter, Paul Elsner, Chancellor Emeritus of Maricopa Community Colleges, discusses the history of blending in the Maricopa Community College system in the Phoenix, Arizona area. It outlines a trend towards blending which seems to be driven by two factors: (1) convenience and choice on the part of the student, and (2) the fact that it allows and perhaps even encourages more engaging pedagogical strategies. Five individuals from across the system are interviewed and provide their insights and perspectives into blended learning within the Maricopa system. One of many significant issues raised is the importance of socialization in the learning process.

Israel - The authors of this chapter share research data regarding the adoption and Tw(¢53Maricopa Communi0arch dsne)4.8a

diffusion across instructors, students, and courses as well as in the richness and depth of the pedagogical strategies used.

United Kingdom - This chapter by Gilly Salmon and Naomi Lawless addresses an approach to blended learning in the UK Open University Business School. Since 2002, the OUBS has experimented with providing more flexible approaches to completing its Management Certificate program. These approaches include allowing students to do the program completely online or online with F2F tutoring sessions as well as providing an online option to the traditional residential "Management Challenge" component of the program. Those who select the online option have been able to engage in group work and form social bonds with peers even though they are not meeting F2F. Salmon and Lawless also provide several basic guidelines for promoting self-managing groups in online environments. By allowing students the opportunity to choose a blend, the authors conclude that they are enhancing both the satisfaction and learning of their students.

South Africa - Research presented in the final chapter of this section helped to analyze math education courses at the University of Pretoria which has seen exploding growth of blended learning since 1999. In fact, Pretoria now has enrollments of over 20,000 online students, the vast majority of which are receiving blended learning experiences. This chapter focuses on blended learning at the course level. An "anti-semester" course in calculus is available for students who have to repeat the course in a second semester. The anti-semester course takes a blended approach with predominantly online materials, group work, etc. Students also have the option of attending a weekly lecture session. A detailed case study of the anti-semester course is provided.

Importantly, a model is provided for analyzing the blendedness of mathematics courses. This model, which could be readily used at other colleges and universities, entails a radial with six dimensions. The top three dimensions deal with interaction while the bottom three consider the course materials. The resulting radial or picture for a particular class allows one to quickly assess the level of online versus F2F emphasis in these areas. Three brief examples and radials are provided.

SECTION 6: MULTINATIONAL BLENDED LEARNING PERSPECTIVES

As new learning technologies and online programs, courses, and resources emerge in education, there are concerns about the reach of these educational innovations to needy learners around the world. This section discusses a few innovative programs and approaches developed by Cisco Systems and the World Bank. Among the many lessons learned from these programs as they are extended around the planet includes the lack of required technological infrastructure and teacher training. As innovative blended learning programs are delivered, they must address a plethora of implementation complexities such as those relating to different cultures, languages, time zones, and educational systems. In addition to specific program initiatives, there is a need for thoughtful governmental policies related to blended learning.

Jane Massy's introductory chapter to this section begins with an informed critique of current progress in the integration of information and communication technologies (ICT) into Europe's education and training systems. She provides a narrative of the development and progress of the European Union's policies related to e-learning. Many important issues are raised that challenge prevailing assumptions about adoption levels, the perceived value of self-managed learning, formal vs. informal learning, and the impact of ICT usage on the social divide.

In the following chapter, Michelle Selinger provides us with a personal journey from her academic post in the United Kingdom to becoming a key education advisor at Cisco in Europe, Africa, and the Middle East. Dr. Selinger describes her involvement in three major blended learning initiatives: (1) Rwanda teacher training, (2) the Cisco Networking Academy (CNA), and (3) the Jordanian e-maths curriculum. The Rwandan

initiative involved the use of the Internet, satellite TV, and F2F training. The CNA incorporated e-learning materials and online testing mediated by teaching from local tutors and instructors. The Jordanian e-maths curriculum was built on the CNA model in developing a technology-rich math curriculum used by local teachers. From this experience, Selinger reflects on the important role of the teacher in mediating learning experiences to make e-learning content culturally and pedagogically relevant to the learners. Based on her experience, the most successful e-learning was actually blended learning since it usually involved personal contact with a tutor or instructor.

SECTION 7: WORKPLACE, ON DEMAND, AND AUTHENTIC LEARNING

The blending of technology is linking colleges and universities with corporate and other authentic learning settings. To begin to understand what is occurring or possible as well as increasingly required in the area of workplace learning, this section of the handbook includes chapters which detail emerging trends in workplace, work flow, and on demand learning. Several of these chapters discuss how learning in the workplace can offer opportunities for mentoring and apprenticeship that are not possible in more formal academic settings. The authors suggest that the results these trends toward learning authenticity will be learners who have more control over their own learning and are more satisfied with it.

The initial chapter here by Betty Collis from the Netherlands discusses two major challenges being faced by many global companies. The first challenge stems from the rapid growth of knowledge within a company, whereas the second challenge is the direct result of personnel changes as an older workforce is replaced by a younger more global workforce. These challenges are being met by blending aspects of both classroom (formal) learning and workplace (informal) learning. Technology is used to mediate much of the learning that occurs. About half of the 65 courses created using this model still have classroom components while the other half do not. For example, in the case provided in this chapter, learners are mentored to complete projects in the local workplace by managers and peers as well as at a distance through the use of web-based tools. Materials that once formed the center of classroom training environments are also available electronically for guidance in each step of the process.

The following chapter by Harvey Singh shares a vision of the past, present, and future of blended learning. Singh paints a picture of how blended learning environments have become increasingly sophisticated in addressing learning challenges. The author argues that blended learning will increasingly support real-time workflow learning. In a real-time workflow, environment learning and work are seamlessly integrated and supported with knowledge and performance tools. To make his point, Singh highlights several differences between the current paradigm of blended learning and the real-time workflow learning paradigm. Components of a real-time workflow learning architecture are outlined and an example is provided.

In the chapter by DeViney and Lewis, the focus is on the change in training at IBM towards a more "embedded" approach where learning is built into the workflow. In this context, perceived corporate needs such as improved transfer of learning, accelerated deployment of best practices, and enhanced learner-worker interactions are discussed. Also described is IBM's new Edvisor online tool that functions as an "e-coach" to learners. The Edvisor system is an intelligent agent that provides the learner with guidance in creating a personalized learning path through online learning modules in preparation for a F2F training experience. The guided online learning component of the training reduces the required amount of F2F workshop time and transforms what was originally a single classroom event into a learning process more embedded throughout the day-to-day work.

The final chapter of this section by Oliver, Herrington, and Reeves focuses on the use of blended learning approaches to support authentic learning activities. Ten research-supported characteristics of authentic learning activities are outlined and are coupled with

opportunities for blended learning. Two illustrative cases are presented that use blended learning to support authentic learning activities. The first case is a research methods course that combines a web-based virtual learning environment with F2F collaborative sessions for scaffolded learning and community building. The second is a course for realtors to be taken in a workplace setting. Many of the authentic activities take place in a virtual reality environment supported by F2F discussions and interactions with peers and mentors.

SECTION 8: FUTURE TRENDS IN BLENDED LEARNING

In the final section of the Handbook of Blended Learning are three exciting chapters on future directions of blended learning. Here, emerging technologies are showcased including simulations, mobile technologies, augmented reality, and reusable content objects. Without a doubt, dozens of technologies currently emerging to impact academic learning as well as training environments will dramatically expand blended learning options and opportunities. As online learning technologies continue to evolve and bandwidth increases while becoming more affordable, a handbook of blended learning a decade from now (assuming handbooks still exist) will have chapters vastly different from those presented in this volume. Of course, the pedagogies that are selected in conjunction with these technology tools will determine the overall learning results.

The opening chapter of this final section, from Bob Wisher of the Advanced Distributed Learning (ADL) Initiative within the Department of Defense, provides interesting insights into a wide range of blended learning environments that are emerging in the U.S. military. Importantly, Dr. Wisher addresses the use of intelligent tutoring systems, simulations, and the use of electronic collaborative learning tools in the context of individual training. In the area of training collectives or groups of individuals, this chapter provides examples of distributed simulations as well as Live-Virtual-Constructive (L-V-C) simulations. L-V-C's are large scale operations that involve the interaction between forces operating in live fire ranges with forces using virtual simulators (e.g., helicopter simulators) and constructive simulations to help combine all the parts together in a way that the participant cannot tell the difference between them. This chapter also

addresses the ADL vision and importance of standards such as SCORM for facilitating the interoperability and use of learning objects.

The chapter from Jamie and Sonny Kirkley introduces the concept of "mixed reality" training that blends elements of real world and virtual reality training experiences. Three types of mixed reality are introduced with examples: (1) augmented vision (adding visual information into the learners context), (2) augmented reality (overlays virtual information onto the real world), and (3) augmented virtuality (places some real objects in a mostly virtual world). In addition to providing two example cases, the authors introduce a model of problem-based learning (called problem-based embedded training) for use in mixed reality training environments.

In the last chapter, Bonk and Kim recap many aspects of this handbook, while also pushing ahead with new data and predictions related to blended learning. They begin by sharing the results of two studies conducted on the future of online teaching and learning - one in higher education and one in corporate training. The data show a perceived shift over the next decade towards the use of blended approaches in both higher education and workplace environments. Results are also presented regarding survey respondent perceptions of what pedagogical techniques and technologies will be most widely used within e-learning. Importantly, similar data is shared from the perspective of corporate managers and higher education instructors, instructional designers, and administrators. To conclude this chapter, Bonk, Kim, and Zeng provide an insightful list of ten major trends and predictions for the future direction of blended learning.