

10 Ways to Better Blended Learning for Knowledge Workers

OBJECTIVES

This session will help practitioners:

- Identify knowledge workers.
- Apply ten appropriate blended learning strategies.
- Describe lessons learned in applying the strategies.

BIOGRAPHIES

Deborah Stone (Dstone@dls.com) has been the President and CEO of DLS Group, Inc. since 1982. Headquartered in Denver with an East Coast branch office in Washington, DC, DLS specializes in improving performance by leveraging cutting-edge technologies based on proven research, theory, and best practices.

Deborah has received over 20 professional awards, including Microsoft's Award of Excellence for the Outstanding Performance Support System. A certified Human Performance Technologist, she has delivered over 75 presentations and three Masters' Series at various conferences and has co-authored numerous articles that focus on applying the latest, proven research to real-world performance solutions.

Deborah received a full scholarship and fellowship to Brown University before completing her graduate work in Instructional Technology at San Francisco State University. She sat on ISPI's Board of Directors from 1991-1993 and chaired the International Conference in Denver. Deborah is also a long-standing member of ASTD and a member of its 2005 ICE Program Advisory Committee. She has been appointed to numerous advisory boards in the educational, private, and not-for-profit sectors. Deborah is the proud mother of a 14-year-old boy named Sam and a cat named Gizmo.

Dr. Steven Villachica, (SVillachica@dls.com) is Chief Learning Officer (CLO) for DLS Group, where he specializes in applying cognitive research and assessment to technology-based delivery platforms. A frequent presenter at international conferences and member of ASTD, Steve also co-authored the chapter on PSS appearing in the second edition of the Handbook of Human Performance Technology. A two-time winner of ISPI's Outstanding Systematic Approach award and Certified Performance Technologist, he completed his doctorate in educational technology at the University of Northern Colorado. Steve is also a Certified Performance Technologist.

Contact Information

DLS Group, Inc. : 303-333-4513
3773 N. Cherry Creek Drive, Suite 575 : 303-393-6320
Denver, CO 80209 www.dls.com

TABLE OF CONTENTS

Presentation Slides.....	1
Knowledge Worker Factoids.....	16
Definitions of Blended Learning	20
Components of Blended Learning.....	21
Interactive Exercise 1: Identify Knowledge Workers.....	22
Interactive Exercise 2: Blended Learning Strategies 1-5.....	23
Interactive Exercise 3: Blended Learning Strategies 6-10.....	24
Citations	26

10 Ways to Better Blended Learning for Knowledge Workers



Deborah L. Stone, CPT
President and CEO

Steven W. Villachica, Ph. D., CPT
Chief Learning Officer

www.dls.com

Presented at the November, 2006 meeting of the ISPI Front Range Chapter, Denver CO

1



Agenda

- ✓ Identify knowledge workers
- Apply ten appropriate blended learning strategies
- Describe lessons learned in applying the strategies

2



What's All the Buzz About Knowledge Workers?

THE WALL STREET JOURNAL

"We're all knowledge workers now" (Thurm, 2006)

"In the early twenty-first century, it's likely that a quarter to a half of workers in advanced economies are knowledge workers" (Davenport, 2005)

"The only way an organization in a knowledge-based economy and society can excel is by getting more out of the same kind of people—by managing its knowledge workers for greater productivity and 'to make ordinary people do extraordinary things'" (Peter Drucker, 2002)

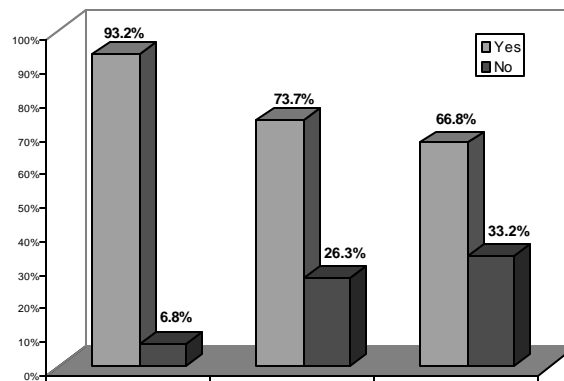
3



What is Blended Learning?

Definitions

Which of the following definitions of blended learning are accepted and used by your organization?

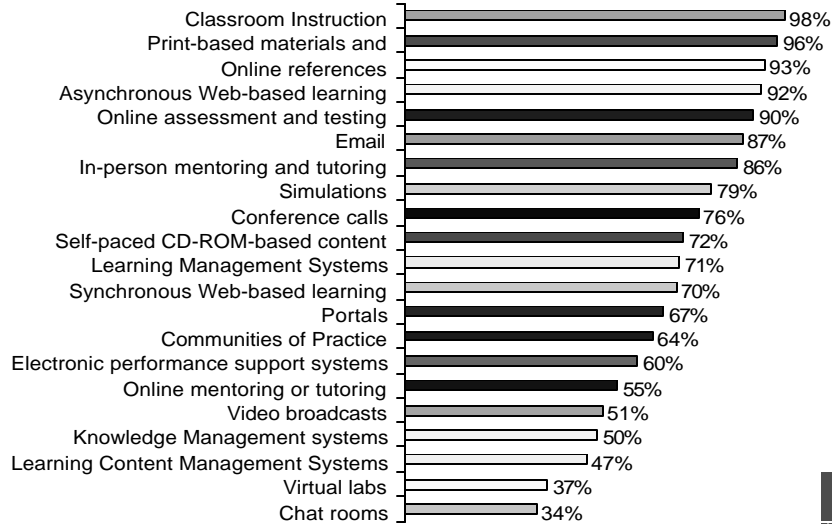


(Pulichino, 2004) ⁴



What is Blended Learning?

A Mix of Media



(Pulichino, 2004) 5



Why Is This Important?



- Learning and job support for knowledge workers are different
 - ◆ Problem-solving and decision making
 - ◆ Novelty
 - ◆ Formal and tacit knowledge
- Approaches cut across media
- Media don't affect learning. They affect efficiency and access (Clark, 1994)
- Various approaches can decrease ramp-up time and improve productivity
- Budgets and performance requirements constrain approaches

6



Interactive Exercise 1

Identify Knowledge Workers



- Split into groups of 2-5 people
- Review the list of potential knowledge workers
- Check “Yes” or “No” to indicate whether you think each group does knowledge work
- Write a rationale for your decision
- List knowledge workers that your organization supports
- After 5 minutes, we’ll debrief

7



Agenda

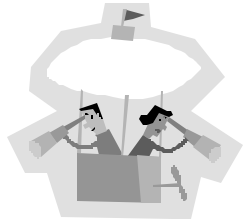
Exercise 2

- ✓ Identify knowledge workers
- ✓ Apply ten appropriate blended learning strategies
- Describe lessons learned in applying the strategies

8



1: Model expert performance using role plays, video, and/or audio



- Rationale
 - ◆ “You can observe a lot just by watching”
–Yogi Berra
- Potential Approaches
 - ◆ Streaming audio and video
 - ◆ Comic strip panels
 - ◆ Guest presenters

9



2: Use experts as coaching “narrators”



- Rationale
 - ◆ Learn from the best
- Potential Approaches
 - ◆ Separate experts for each topic in novice courses
 - ◆ Multiple experts for each topic in higher-level courses

10



3: Situate learning and performance in authentic settings



- Rationale

- ◆ Train how you fight; fight how you train

- Potential Approaches

- ◆ Case study
- ◆ Online simulation
- ◆ Problem-based learning

11



4: Teach the mental models, “rules of thumb,” and process controls that guide expert performance



- Rationale

- ◆ Make invisible cognitive skills visible

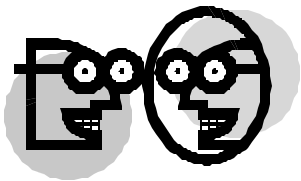
- Potential Approaches

- ◆ Graphically depicted mental models
- ◆ Stated rules of thumb (heuristics) and process controls (what to do next)
- ◆ Practice beyond mastery

12



5: Use articulation and reflection loops



- Rationale
 - ◆ State what you're thinking and compare it to experts
- Potential Approaches
 - ◆ Open-ended questions comparing what learner would do to the expert's response
 - ◆ Think-alouds during coaching and mentoring

13



Interactive Exercise 2

Specifying Blended Learning Strategies



- Split into groups of 2-5.
- Refer to Exercise 2 in your Supplemental Materials.
- Select a group of knowledge workers.
- Select at least two strategies for delivering effective blended learning.
- Write down how you'd apply the strategies in the last column.
- After 10 minutes, we'll debrief.

14



6: Employ scaffolding to enable learners to perform real tasks until they master them



■ Rationale

- ◆ Training wheels help you perform immediately

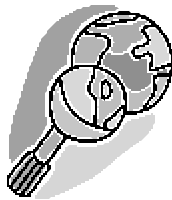
■ Potential Approaches

- ◆ Long/short leash instruction
- ◆ Job aids, including cue cards
- ◆ Novice and expert “views” of software

15



7: Teach global before detailed skills



■ Rationale

- ◆ Knowing the big-picture “lay of the land” guides people as they solve problems

■ Potential Approaches

- ◆ Provided big picture
- ◆ Funneled sequences of instruction that place the organization, group, job, mental models, and tasks in context

16



8: Increase the complexity and diversity of examples over time



- Rationale
 - ◆ Learn how to respond to what you'll face on the job
- Potential Approaches
 - ◆ Representative “slam dunk” case study evolves to an open-ended simulation
 - ◆ On-the-job training assignments grow increasingly complex

17




9: Embed learning and job support within a community of practice





- Rationale
 - ◆ Learn how to “play nice” with the people in your neighborhood, broaden your resources, and ensure currency
- Potential Approaches
 - ◆ Coaching/mentoring
 - ◆ Networking
 - ◆ Wikis, blogs, and forums
 - ◆ Success-stories databases
 - ◆ Group-based practice activities

18

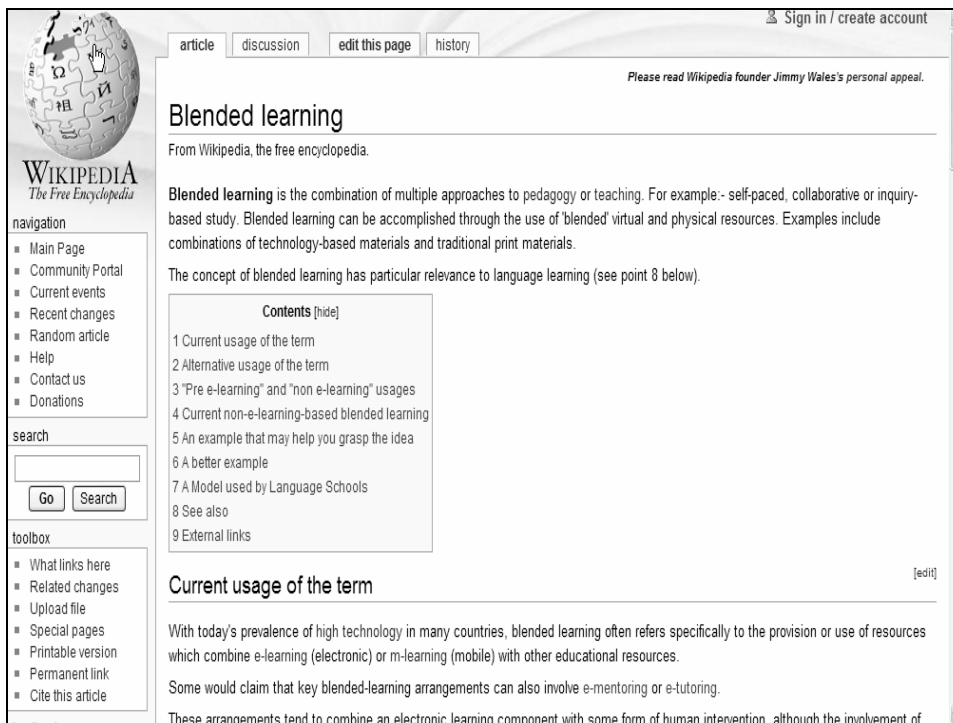





Since 1978 **ISPI - Front Range Chapter**



19



Sign in / create account

article discussion edit this page history

Please read Wikipedia founder Jimmy Wales's personal appeal.

Blended learning

From Wikipedia, the free encyclopedia.

Blended learning is the combination of multiple approaches to pedagogy or teaching. For example- self-paced, collaborative or inquiry-based study. Blended learning can be accomplished through the use of 'blended' virtual and physical resources. Examples include combinations of technology-based materials and traditional print materials.

The concept of blended learning has particular relevance to language learning (see point 8 below).

Contents [hide]

- 1 Current usage of the term
- 2 Alternative usage of the term
- 3 "Pre e-learning" and "non e-learning" usages
- 4 Current non-e-learning-based blended learning
- 5 An example that may help you grasp the idea
- 6 A better example
- 7 A Model used by Language Schools
- 8 See also
- 9 External links

Current usage of the term

[edit]

With today's prevalence of high technology in many countries, blended learning often refers specifically to the provision or use of resources which combine e-learning (electronic) or m-learning (mobile) with other educational resources.

Some would claim that key blended-learning arrangements can also involve e-mentoring or e-tutoring.

These arrangements tend to combine an electronic learning component with some form of human intervention, although the involvement of

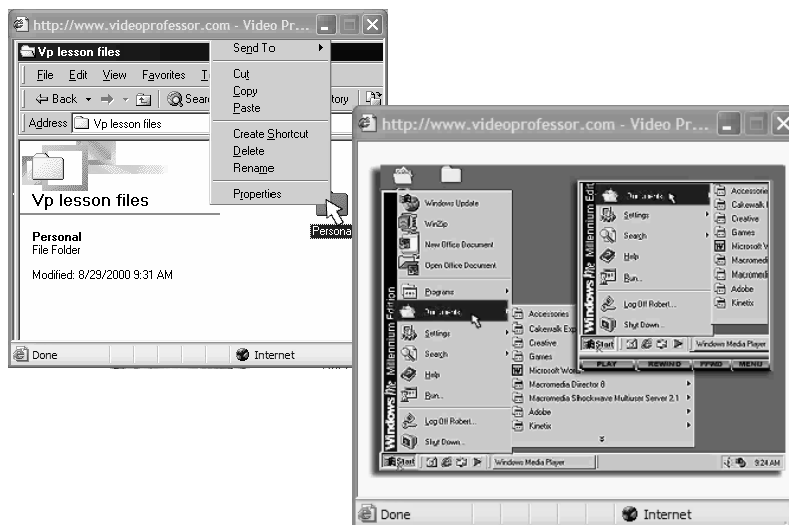
10: Separate what users need to practice from what they need to access

- Rationale
 - ◆ It takes less time to use information than to practice performance to mastery level
 - ◆ Training is difficult to access on the job
 - ◆ Information is more volatile and less expensive to update
- Potential Approaches
 - ◆ Modularized information, training, job aids, and tools
 - ◆ “Use” objectives, rather than “recall”
 - ◆ Friendly, intuitive, and consistent interface design that eliminates or minimizes the need for training
 - ◆ Information and tools embedded on the job and accessible during training, rather than buried in the training

21



Non-Example



22



Interactive Exercise 3

Specifying Blended Learning Strategies



- Split into groups of 2-5.
- Refer to Exercise 3 in your Supplemental Materials.
- Select a group of knowledge workers.
- Select at least two strategies for delivering effective blended learning.
- Write down how you'd apply the strategies in the last column.
- After 10 minutes, we'll debrief.

23



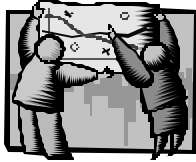
Agenda

- ✓ Identify knowledge workers
- ✓ Apply ten appropriate blended learning strategies
- ✓ Describe lessons learned in applying the strategies

24



Ten Blended Learning Strategies

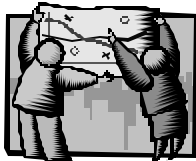


1. Model expert performance using role plays, video, and/or audio
2. Use experts as coaching “narrators”
3. Situate learning and performance in authentic settings
4. Teach the mental models, “rules of thumb,” and process controls that guide expert performance
5. Use articulation and reflection loops

25



Ten Blended Learning Strategies (continued)



6. Employ scaffolding to enable learners to perform real tasks until they master them
7. Teach global before detailed skills
8. Increase the complexity and diversity of examples over time
9. Leverage communities of practice before, during, and after training
10. Separate what users need to practice from what they need to access

26



Lessons Learned



- Teaching and supporting complex cognitive skills requires different strategies
- These strategies are complementary
- Focus on keeping it real
- Employ appropriate mixes of blended learning media
- These strategies improve transfer and decrease ramp-up time to job performance

27



Thank You!

For more information describing these strategies, please see:

Collins, A. Brown, J. S., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. *American Educator: The Professional Journal of the American Federation of Teachers*, 15 (#3), 6-11, 38-46. Available at <http://www.21learn.org/arch/articles/brownseely.html>

28



Open Discussion



Your questions and comments

29



KNOWLEDGE WORKER FACTOIDS

It's already apparent that the firms with the highest degree and quality of knowledge work tend to be the fastest growing and most profitable. Microsoft, for example, is one of the most profitable organizations in the history of the planet. Pharmaceutical firms not only produce sophisticated and life-saving drug treatments, they also tend to have high profit margins. Growth industries generally tend to be those with a high proportion of knowledge workers.

Davenport (2005).

Today, knowledge workers comprise a plurality of the work force. While at the beginning of the 20th century, unskilled labor accounted for about 90% of the work force, today that figure is closer to 20%. As a result, the knowledge work force has become the linchpin to an organization's success, as the world morphs into a knowledge economy.

The change represents a significant challenge to managers who are accustomed to managing workers in more traditional roles. The minimum cost of tools and technologies that supports these workers, estimated to be between \$5,000 and \$10,000 per employee per year, is growing steadily, yet most companies have failed to recognize the changes they need to make in how they conduct business.

Corporate managers need to look for ways in which they can view and manage their human resources as a pool of intellectual capital—raw material for the knowledge economy. Knowledge workers spend at least 20% of their time each day searching, and the majority of those searches fail or do not provide complete results.

Spira (2005).

In sum, topflight research communities, and increasingly demanding American customers and their growing appetite for ever more sophisticated products and services, all spell more knowledge work in the United States, not less. Between 1999 and 2003 (the latest year for which we have data), the number of IT-related white-collar jobs in the United States actually increased. IT wages are rising, too (adjusted for inflation and the business cycle).

Reich (2005).

Knowledge workers grew as a share of total employment in each of the five decades and were the fastest-growing group in all but the 1950s.

Wolff (2005).

Knowledge workers make decisions that significantly impact organizational resources and are themselves a significant and costly resource; knowledge workers compose 43 percent of the white-collar sector, which in turn comprises 67 percent of the service sector.

Roach (1991).

The executive search firm Christian and Timbers reports that industrial workers should be retrained to be knowledge workers in the future. Unless this is accomplished, 20% of all jobs by the year 2000 will be left vacant due to shortage of needed knowledge workers. This type of employees is described as individuals whose principal value is to collect, interpret and distribute information in knowledge-oriented industries, including computers, medical care, communications and instrumentation. Employers and educators should develop strategies to prepare workers for a changing workplace, providing them with more formal education and continuous learning than blue-collar workers. The best source of knowledge workers is the blue-collar sector, where unskilled employees who are willing to be retrained for a knowledge-based economy can be found.

Managing Office Technology (1997).

A company's middle managers and line employees, not just its high-level executives, need to see business data. They're the people who need precise, actionable data because they're the ones who need to act. They need an immediate, constant flow and rich views of the right information. Companies should spend less time protecting financial data from employees and more time teaching them to analyze and act on it.

Time (1999).

Many of the problems relate to the very nature of knowledge work: its inputs are not clearly definable; it generates intangible outputs; and it allows a high degree of discretion on the part of the performer. Knowledge work is often complex and non-routine, and commonly requires the contribution of several people to complete a given task.

Beruvides & Sumanth (1987).

The newest job title sprouting up in information technology circles is chief knowledge officer. The job description generally focuses on bringing together and leveraging pockets of business and technical knowledge to advance the company's competitive position, and involves not only locating, but also organizing, manipulating, filtering and presenting information so that employees on the front lines can comprehend and use it. Hal Varian, dean of the University of California at Berkeley's School of Information Management and Systems, says, "There are a lot of information resources a company has that need to be structured to be useful." Providing that structure and working with the technical side of the corporation to make the information resources available and useful to employees will be an increasingly key activity at most businesses in coming years.

Information Week (1997).

We've looked at a database of about a thousand companies, and it turns out that about 80 percent of businesses are spending more on information work and [on creating intellectual assets] than they are on the cost of covering their capital... Think of what happens if virtually everybody in an enterprise is a knowledge worker - somebody who has the ability, authority, and responsibility for determining what they do and how they do it. They're actually decision makers.

You've empowered all these people. What you don't do with knowledge workers is tell them how to do what they do. They're the experts. What you want to do is get them all doing their thing together, because knowledge is the one inexhaustible resource. The more of us that get together in a room like this and share ideas, the more new knowledge we're going to create. The key is how do you get knowledge workers to share this knowledge, produce new information and use it in a new way? ...

What limits will businesses come up against in exploiting technology? One limitation of business [will be] the availability of knowledge workers and the ability of any enterprise to organize knowledge work productively. We don't know a lot about how to do that. Only about a third of the adults in this country have a college education. And I don't know that it takes a college degree to be a knowledge worker. Mr. Gates, of course, is a good example. But it takes more knowledge and more education than less to be a good knowledge worker.

Abramson (1999)

People often identify learning with time spent in school -- that traditional-looking building with classrooms, desks, and blackboards. In the new economy, knowledge workers must blend continuous learning with their daily work to be successful. Today, companies thrive because their knowledge workers learn actively.

DeLima (1998).

And preliminary evidence from colleges and universities throughout the country indicate that there have already been significant increases in enrollments in computer engineering, computer science and information management education programs in recent years. These increases are due in part to evidence of a growing demand for talented "knowledge workers" in the form of steady increases in the volume of job advertising and the levels of compensation being offered to new graduates from high quality educational programs.

Reinert (1998).

Of the Big Six consulting firms, Coopers & Lybrand, Ernst & Young, KPMG Peat Marwick, and Price Waterhouse now have chief knowledge officers or chief learning officers. The University of California at Berkeley recently named the first professor of knowledge. And the Gartner Group projects that knowledge management will become a \$2 billion market in the next four years.

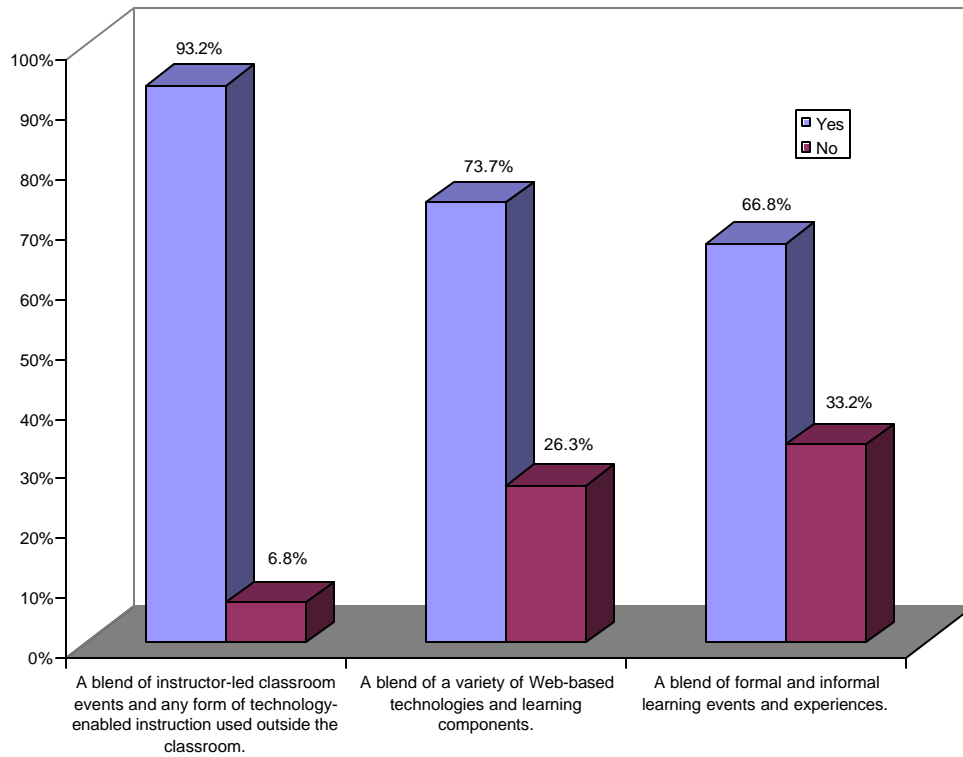
Richtel (1997).

The days of labor-intensive capitalism are gone. Natural resource wealth, labor capital, and tangible products have been replaced by knowledge as a source of wealth. By 2010 this “knowledge economy” will influence policy, education, military and religion as well as how women participate in the workforce. The term “blue collar” will become obsolete as knowledge workers emerge. Knowledge professionals—like electrical engineers—will continue learning throughout their careers. The distribution of knowledge will become more important than the distribution of products, a trend already visible in the application of intellectual property. In this world of knowledge, innovation and new approaches, along with “out of the box” thinking, will be combined with traditional problem-solving skills to exploit knowledge in the marketplace. In this world, “differences” in thinking provide a real business advantage, and women can provide that advantage.

The shift to knowledge workers with specialties means no one person can know the whole job. Everyone will be responsible for the success of an enterprise. Studies show that women do “information sharing” and “power sharing” well. In fact, gender differences transcend national differences, so women across national boundaries find much in common, a real strength in globalization.

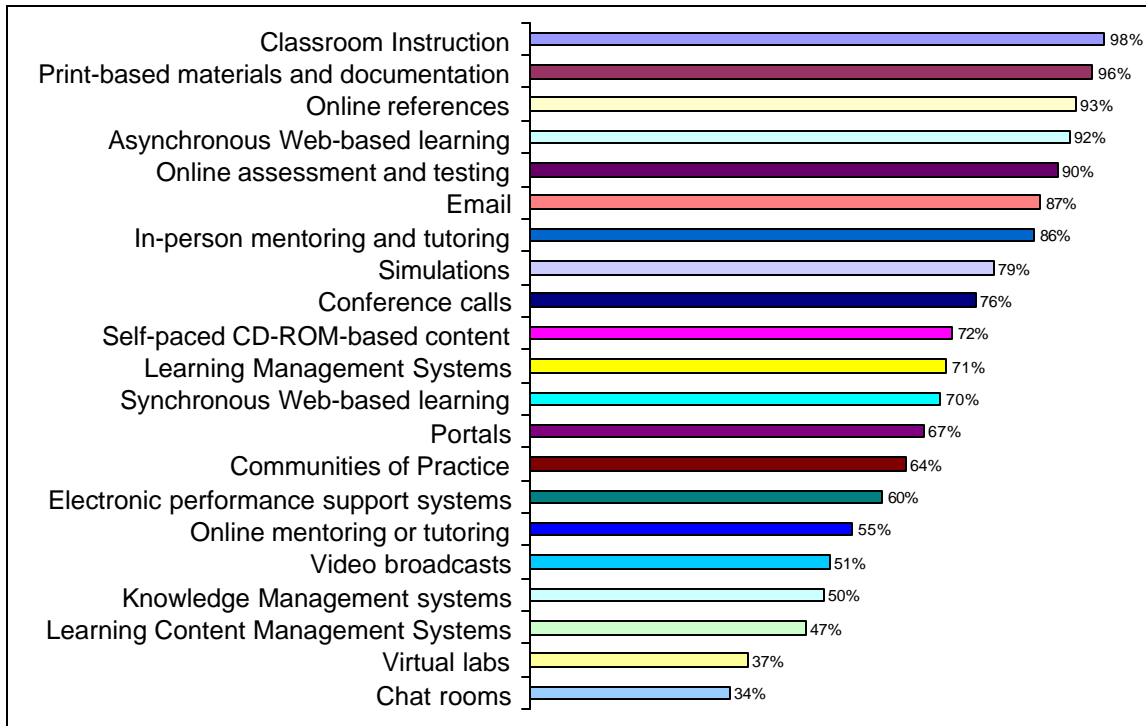
Shimer (1996).

DEFINITIONS OF BLENDED LEARNING



Pulichino, J. (2004)

COMPONENTS OF BLENDED LEARNING



Pulichino, J. (2004)

INTERACTIVE EXERCISE 1: IDENTIFY KNOWLEDGE WORKERS

Part I Instructions

1. Split into groups of 2-5.
- ② Review the list of potential knowledge workers.
- ③ Check “Yes” or “No” to indicate whether each group does knowledge work.
- ④ Write the rationale for your decision in the **Rationale** column.
5. After 5 minutes, we’ll regroup.

Workers ②	Knowledge Workers? ③	Rationale ④
1. Pharmaceutical sales reps	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2. Airplane mechanics	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3. Factory workers	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4. Technical trainers	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5. Construction workers	<input type="checkbox"/> Yes <input type="checkbox"/> No	

Part II Instructions

List one or more population of knowledge workers in your own organization that your blended learning efforts support.

1. _____
2. _____
3. _____
4. _____
5. _____

INTERACTIVE EXERCISE 2: BLENDED LEARNING STRATEGIES 1-5

Instructions

1. Split into groups of 2-5.
2. Select a group of knowledge workers.
3. Select at least two strategies for delivering effective blended learning.
4. Write down how you'd apply the strategies in the last column.
5. After 10 minutes, we'll debrief.

Strategy	Rationale	Potential Approaches	Your Own Efforts ④
1. Model expert performance using role plays, video, and/or audio.	"You can observe a lot just by watching." – Yogi Berra	<ul style="list-style-type: none"> ➤ Streaming audio and video. ➤ Comic strip panels. ➤ Guest presenters. 	
2. Use experts as coaching "narrators."	Learn from the best.	<ul style="list-style-type: none"> ➤ Separate experts for each topic in novice courses. ➤ Multiple experts for each topic in higher-level courses. 	
3. Situate learning and performance in authentic settings.	Train how you fight; fight how you train.	<ul style="list-style-type: none"> ➤ Embedded case study. ➤ Online simulation. ➤ Problem-based learning. 	
4. Teach the mental models, "rules of thumb," and process controls that guide expert performance.	Learning what experts do in their minds requires making invisible cognitive skills visible.	<ul style="list-style-type: none"> ➤ Graphically depicted mental models in advanced organizers and instructional content. ➤ Stated rules of thumb (heuristics) and process controls (what to do next). ➤ Allow opportunities to practice to mastery—and beyond. 	
5. Use articulation and reflection loops.	State what you're thinking and compare it to experts.	<ul style="list-style-type: none"> ➤ Open-ended questions comparing what learner would do to the expert's response. ➤ Think-alouds during coaching and mentoring. 	

INTERACTIVE EXERCISE 3: BLENDED LEARNING STRATEGIES 6-10

Instructions

1. Split into groups of 2-5.
2. Select a group of knowledge workers.
3. Select at least two strategies for delivering effective blended learning.
4. Write down how you'd apply the strategies in the last column.
5. After 10 minutes, we'll debrief.

Strategy	Rationale	Potential Approaches	Your Own Efforts ④
6. Employ scaffolding to enable learners to perform real tasks until they master them.	Training wheels help you perform immediately.	<ul style="list-style-type: none"> ➤ Long/short leash instruction. ➤ Job aids, including cue cards. ➤ Novice and expert “views” of software. 	
7. Teach global before detailed skills.	Knowing the big-picture “lay of the land” guides people as they solve problems.	<ul style="list-style-type: none"> ➤ Provided big picture. ➤ Funneled sequences of instruction that place the organization, group, job, mental models, and tasks in context. ➤ Layers of elaboration. 	
8. Increase the complexity and diversity of examples over time.	Learn how to respond to what you'll face on the job.	<ul style="list-style-type: none"> ➤ Representative “slam dunk” case study evolves to an open-ended simulation. ➤ On-the-job training assignments grow increasingly complex. 	
9. Leverage communities of practice before, during, and after training.	Learn how to “play nice” with the people in your neighborhood, broaden your resources, and ensure currency.	<ul style="list-style-type: none"> ➤ Coaching/mentoring. ➤ Wikis, blogs, and forums. ➤ Success stories databases. ➤ Group-based practice activities. 	

Strategy	Rationale	Potential Approaches	Your Own Efforts ④
10. Separate what users need to practice from what they need to access.	It takes less time to use information and perform than to practice performance to mastery level. Information and tools that are embedded in the training are difficult to access on the job.	<ul style="list-style-type: none"> ➤ Modularized information, training, and tools. ➤ Job aids and information systems. ➤ “Use” objectives, rather than “recall.” ➤ Friendly, intuitive, and consistent interface design that eliminates or minimizes the need for training. ➤ Information and tools embedded on the job and accessible during training, rather than buried in the training. 	

CITATIONS

Beruvides, M.G., & Sumanth, D.J. (1987). Knowledge work: A conceptual analysis and structure. In Productivity Management Frontiers-I (pp. 127-138). London: Elsevier Science.

Brown, J. S., A. Collins, & Duguid, P. (1989). Situated cognition and the culture of learning. Educational Researcher, 18 (#1), 32-42.

Buffa, D. & Hais, M. (1996). How knowledge workers vote. In Fast Company [web page]. Boston, MA. [cited 19 June 1997]. Available from <http://www.fastcompany.com/05/vote.html>

Casey, C. (1996). Incorporating cognitive apprenticeship in multi-media. Educational Technology Research & Development, 44(1), 71-84.

Chaleff, I. (1995). Process improvement for knowledge workers. AFSM International Professional Journal, 20(3).

Clark, R. E. (1994). Media will never influence learning. Educational Technology, Research & Development, 42(2), 21-29.

Clark, R. E., & Blake, S. B. (1997). Designing training for novel problem-solving transfer. In R. D. Tennyson, F. Schott, N. M. Seel, & S. Kijkstra (Eds.) Instructional Design Perspectives, Volume 1: Theory, Research, and Models (pp. 183-214). Mahwah, NJ: Erlbaum.

Collins, A. Brown, J. S., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. American Educator: The Professional Journal of the American Federation of Teachers, 15 (#3), 6-11, 38-46.

Curtis, R, Leon, D., David Leon Partnership, & Miller, R. (2002, November-December). Supporting knowledge work with physical design. Knowledge Management Review, 5(5) pp 27-29.

Davenport, T. (2002) Can you boost knowledge work's impact on the bottom line? Harvard Management Update 7(12), pp. 3-4.

Davenport, T. (2005) Thinking for a living. Boston, MA: Harvard Business School Press.

Davenport, T., Thomas, R.J., & Cantrell, S. (2002). The mysterious art and science of knowledge-worker performance. MIT Sloan Management Review 44(1), pp. 23-30.

Drucker, P. (1974). Management. New York, NY: Harper & Row.

Drucker, P. (2002, October). Knowledge work. Executive Excellence 19(10), p12.

Ericsson, K. A., & Charness, N. (1994). Expert performance: Its structure and acquisition. American Psychologist, 49, 725-747.

Graham, C. L. (1996). Conceptual learning processes in physical therapy students. Physical Therapy, 76, 856-864.

Hammer, M., Leonard, D., & Davenport, T. (2004). Why don't we know more about knowledge? MIT Sloan Management Review 45(4), pp. 14-18.

Harris, P. (2006). Beware of the boomer brain drain. T+D Magazine 60(1), pp. 30-33.

Lesgold, A., Lajoie, S., Brunzo, M., & Eggan, G. (1992). A coached practice environment for an electronics troubleshooting job. In J. Larkin & R. Chabay (Eds.) Computer Assisted Instruction and Intelligent Tutoring Systems: Establishing Communications and Collaboration (pp. 201-38). Hillsdale, NJ: Erlbaum.

Lesgold, A., Lajoie, S., Logan, D., & Eggan, G. (1990). Applying cognitive task analysis and research methods to assessment. In N. Frederiksen, R. Glaser, A. Lesgold & M. G. Shafto (Eds.), Diagnostic monitoring of skill and knowledge acquisition. Hillsdale, NJ: Erlbaum.

O'Byrne, K., Clark, R. E., & Malakuti (1997). Expert and novice performance: Implications for clinical training. Educational Psychology Review, 9, 321-332.

Pulichino, J. (2004). The Trends In Blended Learning Research Report. Santa Rosa, CA: The eLearning Guild.

Reich, R. (2005, April). Plenty of knowledge work to go around. Harvard Business Review 83(4) p. 17.

Reigeluth, C. M. (1999). The elaboration theory: Guidance for scope and sequence decisions. In C. M. Reigeluth (Ed.) Instructional-design theories and models--Volume II: A new paradigm of instructional theory (pp. 425-453). Mahwah, NJ: Erlbaum.

Ritchie, S. M., & Rigano, D. L. (1996). Laboratory apprenticeship through a student research project. Journal of Research in Science Teaching, 33, 799-815.

Roach, S. (1991, September-October) Services under siege: The restructuring imperative. Harvard Business Review 82-83.

Savery, J. R., & Duffy, T. M. (1996). Problem-based learning: An instructional model and its constructivist framework. In B. G. Wilson (Ed.) Constructivist Learning Environments: Case Studies in Instructional Design (pp. 135-148). Englewood, Cliffs, NJ: Educational Technology.

Spira, J. (2005, February) Services under siege: In praise of knowledge workers. KM World p. 1, 26-27.

Thurm, S. (2006, January 23). Companies struggle to pass on workers' knowledge. Wall Street Journal, 2006, p. B1.

Villachica, S. W., & Stone, D. L. (1998). CORNERSTONE: A case study of a large-scale performance support system. In P. J. Dean & D. E. Ripley (Eds.) Performance improvement interventions: Performance technologies in the workplace (437-460). Washington, DC: International Society for Performance Improvement.

Williams, S. M. (1992). Putting case-based instruction into context: Examples from legal and medical education. The Journal of the Learning Sciences, 2, 367-427.

Wilson, B. G. & Cole, P. (1996). Cognitive Teaching Models. In D. H. Jonassen (Ed.) Handbook of research for educational communications and technology: A project of the Association for Educational Communications and Technology (601-621). New York: Macmillan Library Reference USA.

Wolff, E. (2005) The growth of information workers in the U.S. economy, 1950-1990: The role of technological change, computerization, and structural change. Communications of the ACM, 48(10), pp. 38-42.