

ACCELERATING INSIGHT THROUGH SCENARIOS

MARTIN A. SIEGEL
WISDOMTOOLS, INC.
SCHOOL OF INFORMATICS
INDIANA UNIVERSITY

When we hear a story that touches us profoundly, our lives are suffused with meaning. As listeners, we have transmitted to us that which matters. Once we make this connection, once a sense of wonder has come upon us, it does not last long, and we inevitably fall back into our daze of everyday living, but with the difference that a radical shift in understanding may have taken place... The story is something that comes from outside. But the meaning is something that emerges from within.

– Stephen Denning (2001)

Today, most Web interactions involve “pointing and clicking” as users navigate through hypermedia text and graphics. While this can be an engaging experience in an ever-expanding, ever-changing digital environment, we question its ultimate value as a learning tool. Exposure to information may be a necessary condition of e-learning, but it hardly exploits the medium as a powerful interactive learning experience. New tools are needed that lead to deep conceptual insights as well as the development of sophisticated problem-solving skills. These tools reflect a shift in focus from content-centered environments to authentic, cooperative, problem-centered learning. We call this paradigm the “Digital Learning Environment.”

This paper discusses characteristics of the Digital Learning Environment (DLE) and describes the kind of cognitive tools required to support the DLE. One such learning tool is *WisdomTools Scenarios*[™]. It represents “next generation” e-learning, and addresses challenges of organizational complexity, dynamics, and culture. Each scenario is designed to develop deep, insightful learning, a kind of “practical intelligence” (Sternberg et al., 2000) or tacit knowledge (Polanyi, 1966).

A Paradigm Shift

[Psychologists] have found in their research that much of the knowledge needed to succeed in real-world tasks is tacit. It is acquired during performance of everyday activities but typically without conscious awareness of what is being learned. And although people's actions may reflect their knowledge, they may find it difficult to articulate what they know. The notion that people acquire knowledge without awareness of what is being learned is reflected in the common language of the workplace as people speak of "learning by doing" and "learning by osmosis." Terms such as professional intuition and professional instinct further imply that the knowledge associated with successful performance has a tacit quality.

– Robert J. Sternberg, et al. (2000)

A central assumption of didactic (instructor-led) learning is that learners' mastery of content will transfer to their ability to process diverse information and solve problems of the everyday world. We now know that this assumption is largely false.

Even the most able learners find it difficult to make appropriate connections between what they learn in the classroom and understanding the nature of problems and their solutions in the workplace and other non-school settings. These workplace or everyday problems are different from the well-structured, single-solution textbook problems solved in school. The following table, adapted from Sternberg (1985), illustrates these differences:

Characteristics of Workplace Problems	Characteristics of Classroom Problems
In the workplace, the first and sometimes most difficult step in problem solving is recognition that a problem exists	The instructor or textbook signals that a problem exists
In the workplace, it is often harder to figure out just what the problem is than to figure out how to solve it	The instructor or textbook provides the problem
Workplace problems tend to be ill-structured	The instructor or textbook defines all aspects of the problem

In the workplace, it is not usually clear just what information will be needed to solve a given problem, nor is it always clear where the information can be found	Needed information to solve classroom or text-based problems is found in the associated chapter or lecture; often parallel problems (examples) are solved for the student
The solutions to workplace problems depend on and interact with the contexts in which the problems occur	Classroom or text-based problems are self-contained; little or no context is provided
Workplace problems generally have no one right solution, and even the criteria for what constitutes a best solution are often not clear	Classroom or textbook-based problems have one right solution; textbook solutions are found in the back of the book
Solutions to important workplace problems have consequences that matter	Solutions to classroom or textbook-based problems have no consequences other than a grade or school advancement
Workplace problem solving often occurs in teams	Classroom or textbook-based problem solving often occurs alone
Workplace problems can be complicated, messy, and stubbornly persistent	Classroom or textbook-based problems are clear, well-defined, and easily forgotten

A new paradigm, consistent with emerging theories of knowing, is required to change the focus from content-centered, explicit knowledge to problem-centered, tacit knowledge. This paradigm — the Digital Learning Environment (DLE) — incorporates the following features:

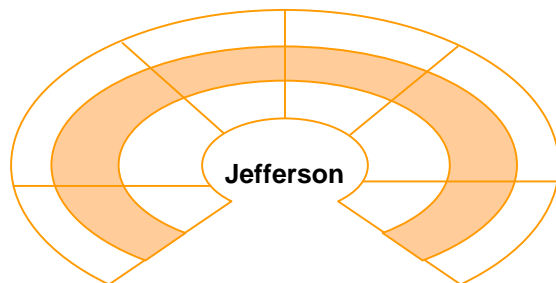
- a learner-centered and problem-based (rather than content-centered) instructional support system, in which learning is based upon analysis of a series of complex, workplace issues rather than upon memorization of facts and principles (Brown, Collins, & Duguid, 1989; Duffy, & Jonassen, 1992)
- safe settings for learning, in which making mistakes becomes as powerful a learning tool as employing successful problem-solving strategies in workplace contexts (Schank, 1994)
- a blurring of instructor and student-employee roles, such that instructors model and demonstrate learning in problem-based settings, while student-employees facilitate and manage their own learning environments (Duffy & Cunningham, 1996)
- access to an integrated package of navigational, productivity, communication, and collaboration tools (Edelson, Pea, & Gomez, 1996; Harasim, Hiltz, Teles, & Turoff, 1995; Soloway, Guzdial, and Hay, 1994)
- management tools that facilitate the development of student-employee goals and activities as a collaboration between student-employees and instructors, of which key components are alternative and traditional assessment practices (Farr & Tone, 1994; Reeves & Okey, 1996)
- independence of any particular hardware or delivery system configuration (Siegel & Sousa, 1994)
- an open information architecture, which has access to a global information network like the Web (or the company's Intranet), in contrast to a closed information architecture (e.g., book, diskette, video disk, or a CD-ROM), which is finite and fixed in time (Siegel & Sousa, 1994)

Taken together, these features are designed to facilitate big concept, multi-disciplinary learning, and the development of authentic, cooperative problem-solving strategies. While explicit knowledge is important in this environment, a kind of practical intelligence or tacit knowledge is required as well. Explicit knowledge can be gained through mere exposure to information. “The key to acquiring tacit knowledge is experience. The mere transfer of information will often make little sense if it is abstracted from embedded emotions and nuanced contexts that are associated with shared experiences” (Nonaka, 1994 p. 19).

Learning how to learn in a domain is as important as accumulating facts and information out of context (Oshima, Bereiter, & Scardemalia, 1995; Riel, 1994). In the DLE, all participants, whether they are managers, instructors, or employees, become simultaneously a coach and learner.

An Unusual Museum

Some years ago I visited the Museum of Westward Expansion, located underground, directly below the St. Louis arch. It's an unusual museum in that it has a unique layout. It's arranged as a series of pie-shaped wedges expanding over a series of concentric arcs:



At the center is a life-size statue of Thomas Jefferson. Each of the wedges represents a different group of people: inventors, farmers, American Indians, miners, etc. Moreover, each arc represents a period of years, from Jefferson's presidency to the present; the outer circle represents the last part of the twentieth century. Once you understand the museum's design, you systematically can investigate various themes — exploring different perspectives during a narrow period of U.S. history (walking along an arc) or exploring a single perspective over a 200 year period (walking through a wedge); obviously other comparisons are possible as well. However, when I spoke to the Park ranger about the museum's structure, she shared two

observations: most people never notice the unique structure, and among those who do, far less know how to systematically explore the structure.

Some years later, knowledge workers find themselves navigating through vast, complex digital structures called “Knowledge Management” systems, searching for solutions to real problems with consequences that matter. Yet, our understanding of how to explore these digital corporate landfills is less clear today than the exploration of the pie-wedged museum. Why?

While we’ve become more sophisticated in storing and organizing ever-increasing amounts of data distributed throughout the planet, our strategies have not moved significantly beyond that of the museum visitors. If we are to accelerate the insights of twenty-first century workers, we require new approaches to their learning. Tutorial-style e-learning is insufficient. New tools are required.

Digital tools such as word processors, spreadsheets, and databases can increase our productivity. Similarly, cognitive tools can change the way we think about authentic, workplace problems, accelerating our insights and strategic understanding. WisdomTools, founded in 1999 as an outgrowth of Indiana University’s Center for Excellence in Education, is developing such tools.

Scenarios: a DLE Tool



Most managers know of the “disconnect” that occurs between classroom or seminar training and employee performance in the workplace. Immediate evaluation of the training experience may reveal that the training was well received and communicated the intended message. Two weeks later, however, management often cannot distinguish between those who attended training and those who did not. Moreover, when management considers all expenditures, including travel costs and lost productivity, the total cost-effectiveness ratio reflects an inferior return on employee training investment.

WisdomTools Scenarios™ is an example of a DLE; it is theory-based to leverage instructional techniques in problem-based learning, case study, storytelling, role-playing, simulation, and collaborative learning.

Key features include:

- **Stories that teach.** Good stories are memorable. They provide context (conditions). They communicate culture as well as skill. They communicate tacit knowledge (that which is difficult to describe in other ways). A scenario is relevant to the learner; it's his or her story, not some abstract parable.
- **Learner interaction and collaboration.** If *Scenarios* were only a story, then learners would be “story voyeurs.” Instead, we create interactive collaborative activities that engage the learner. Their purpose is to help the learner reflect on the story's relevance and contribute to it. Through asynchronous exchanges, multiple points of view are discovered and new insights are learned. Current activities include: discussion forum, point-counterpoint, survey, computer facilitated practice, and quiz. Other activities can be constructed employing the *Scenarios'* object-oriented architecture.
- **Facilitation.** A facilitator moderates a discussion forum and guides the learners through the scenario. Good facilitation can result in sophisticated probes that lead learners to deeper understandings. Some probes may be simulated through seeded and time-revealed messages.
- **Just-in-time resources.** Digital resources anchor the story; they provide needed background material.

To summarize, *Scenarios* moves learners beyond content mastery and memorization to judgment and deep insight. These electronic case studies help employees tackle difficult issues through collaborative and interactive situations. By providing authentic settings,



This symbol is the “L” in WisdomTools’ logotype. Its exclamatory shape signifies the insight and awareness that comes from tacit knowledge. It’s the big “ah ha” of knowing.

realistic scenarios, believable characters, and many opportunities for online interaction, *Scenarios* promises the generation of more complex levels of knowledge.

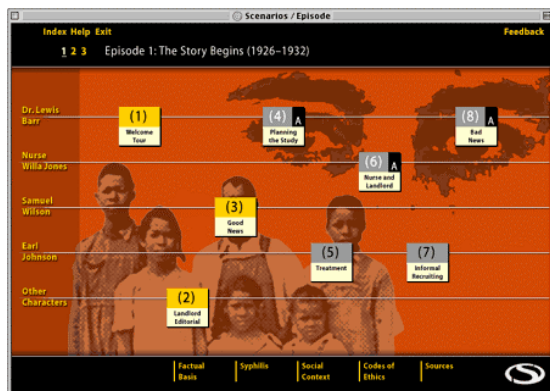
Scenarios Example

Here is a mid-range example of how *Scenarios* works. The example concerns the training of claims examiners in a large insurance company:

- Background: Claims Examiners (CEs) at Anyplace Insurance Corp require sophisticated judgment and knowledge of complex rules and regulations; they have very large case loads; they have little time for classroom-based training; and their judgments, individually and collectively, can have profound financial impact on the company.
- Claims Examiners are chosen to participate in teams on 8-12 learners each. Multiple teams may work independently of one another. If we imagine a team of 12 learners, then ten of the CEs are at similar skill levels and chosen by their supervisors; two of the CEs are at higher skill levels and chosen by their supervisors as coach/facilitators. The CEs are geographically distributed, and likely have never met.
- Each CE is invited by e-mail to participate in the training. The e-mail provides a special login and password and the *Scenarios* site address. Tutorial-like training is given to the learners so that they may be oriented to the tool and its objectives. Each CE proceeds to the site, enters via the login and completes an information form (name, region, years with Anyplace, and additional biographical information). These data are shared with the other participants in the team.
- Once the team is in place and ready to proceed, their first episode is revealed. The story speaks of a CE similar to them. This CE, let's call her "Phyllis," navigates through the complex web of decision making, interacting with clients, medical professionals, managers, colleagues, lawyers, etc. Phyllis appears to make both

competent and questionable decisions. Perhaps it's not until the second episode that we discover that what seemed like an innocent misstep is now quite costly.

A multi-timeline metaphor is used with each character assigned to each timeline. Events on the timeline represent scenario scenes and interactive collaborative activities. The learner, unlike the character in the story, has the “God’s-eye view” of the action, viewing all actions, conversations, and thoughts.



These are screens from the Scenario titled, “The Least of My Brothers.” It focuses on the complex issues surrounding research ethics of human subjects. The scenario is based on the infamous Tuskegee syphilis case.

- Within each timeline element, the CEs read the scenario scene and participate in a variety of collaborative, asynchronous activities. These activities – discussion forums, point/counterpoint debates, surveys, quizzes, and tutorial practices – require the CEs to demonstrate their level of judgment and knowledge. The CEs may agree or disagree among themselves about the “moves” Phyllis and other characters chose. The discussions and debates among the CEs move from a focus on character behavior to discussion of team member behavior – from a discussion of Phyllis to a discussion of self. The *real* story becomes the team’s story.
- Throughout the scenario’s activities, expert commentary from human facilitators is provided. These probes shape and refine the CEs understanding of the scenario. A knowledge layer, or set of resources, is made available to the CEs as they progress through the scenario. These resources (digital documents, Web links, media) underpin the scenario and provide its intellectual foundation.
- Upon completion of all episode activities (usually scheduled for 1-2 weeks), the CEs are invited to study the next unfolding of the scenario. That is, the scenario is revealed in episodes over time — each episode adding more detail and complexity to the scenario. More activities are provided and the CEs respond in kind.
- The training proceeds in the recurring pattern of new scenario episode / activities / responses / expert review and probes. At times the CEs appear to work independently; other times the CEs are asked (by the facilitator) to work in pairs —

agreeing on a joint solution. Over time, the more experienced CEs are seen coaching the less experienced CEs, and the expert review validates experienced CEs' input.

- With the use of *Scenarios*, the process is elegant and transparent. Different points of view can be reflected throughout the scenario — the view of the CE, the client, the legal department, the supervisor, etc. Each viewpoint provides different insights into the scenario and highlights different judgments, strategies, and actions.

This training sequence may take several weeks to complete, the time period being a function of the complexity of the scenario. Over a long period of time, the CEs will complete many such scenarios, sometimes participating as a coach or mentor. All employees should simultaneously view themselves as learners and coaches. The “disconnect” is eliminated, and the learning company becomes real.

Note, of course, that this is but one example, a single title for claims examiners. *Scenarios* is a framework following a standard yet flexible structure: episodes, timelines, characters, events, scenes, activities, knowledge layer with resources, navigation, and performance management. Any business story can fit into the framework – from a standard human resource issue such as sexual harassment to a more complex case of two companies merging their cultures. Is *Scenarios* an e-learning tool or an agent for change?

Isaac Bashevis Singer once said about the Talmud, the collection of books containing Jewish law and tradition, “[It] is called an ocean. You don’t know the whole ocean – all its depths. We mean by this that if you don’t know how to swim it, you sink in it.” Smart organizations, too, depend upon its people learning how to swim. Otherwise, more than the workers will sink. The organization will drown!

What’s your story?



A Hint to the Future

I began to think about the problem of combining soft skills (tacit knowledge) and hard skills (explicit knowledge) into a single global environment. If we could design a framework that combines both, perhaps while at any given moment, emphasizes one or the other, we would lead learners to deep conceptual insights.

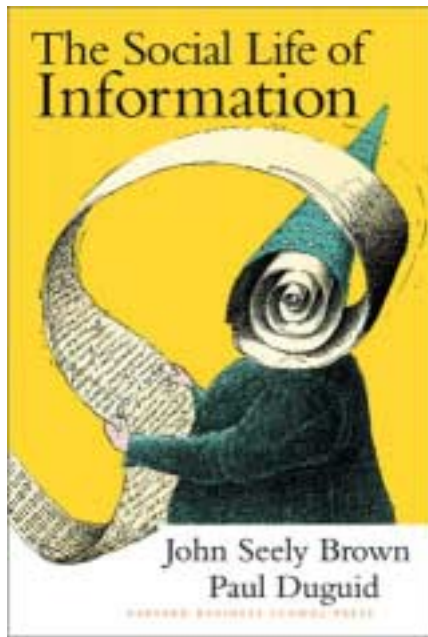
The graphics of E. C. Escher hint at a way to think about the integrated interface. There's a kind of positive/negative interplay; one becomes the other. How so?

In learning tacit skills, the story is fundamental; it provides the required context for understanding the subtleties of the action. But what about explicit skills? Is context (and therefore, perhaps, story) required? I would argue that it is.

Think about learning algebra or geometry (or biology, chemistry, computer programming, government, history, Spanish, French) in high school. Why was it necessary? How was it relevant? The underlying assumption was that if you mastered the material, it would contribute to your success in the world outside of school. Did it?

I assert that placing explicit skills in a context would contribute vastly to the learner's understanding. Might not a story do this? For example, imagine a chemistry class that did not merely focus on the balancing of chemical equations, but placed this skill in the larger context of scientific method and discovery. A compelling story (perhaps historical) would provide strong incentive for the mastery of skills. Moreover, the skill would be grounded in an understandable context. What exactly do we mean by the "scientific method?" How does it play out in reality?

Or take the Claims Examiner example described in a previous section. The scenario focused on the CEs' judgment and strategy in settling claims, arbitrating disputes, etc. However, there are explicit skills that the CE must learn as well: at the low end, the vocabulary of the medical profession (names of procedures, parts of the body, drugs, etc.); at the high end, the CE must learn how to process complex forms, effectively and



Technology design often takes aim at the surface of life. There it undoubtedly scores lots of worthwhile hits. But such successes can make designers blind to the difficulty of more serious challenges – primarily the resourcefulness that helps embed certain ways of doing things deep in our lives.

– John Seely Brown and Paul Duguid
(2001)

efficiently use Anyplace Insurance Corp’s internal management systems, etc. Wrapping explicit skill training around an engaging, authentic scenario that embodies tacit skill development is a combination that heretofore has been implemented as separate training, forcing the workers to integrate the two skill sets into one. *Scenarios* of the future will make this integration seamless.

Conclusion

DLE tools such as *Scenarios* will impact every aspect of how we learn and how we communicate. For the development of quality learning environments, we will need to focus less on the latest web wizardry and more on how the new tools impact our ability to think and learn. In the end, creating the Digital Learning Environment will be a human rather than technological challenge.

References

- Brown, J. S., Collins, A., and Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18 (1), 32-41.
- Brown, J.S., & Duguid, P. (2000). *The social life of information*. Cambridge: Harvard Business School Press.
- Denning, S. (2001). *The Springboard : How Storytelling Ignites Action in Knowledge-Era Organizations*. Butterworth-Heinemann Publishers.
- Duffy, T. M., & Cunningham, D. J. (1996). Constructivism: Implications for the design and delivery of instruction. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology*. New York: Scholastic.
- Duffy, T. M. & Jonassen, D. H. (eds.) (1992). *Constructivism and the technology of instruction: a conversation*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Edelson, D. C., Pea, R. D., & Gomez, L. M. (1996). Constructivism in the Collaboratory. In B. G. Wilson (Ed.), *Constructivist learning environments: Case studies in instructional design*. Englewood Cliffs, NJ: Educational Technology Publications.
- Farr, R., & Tone, B. (1994). *Portfolio and performance assessment: Helping students evaluate their progress as readers and writers*. Fort Worth, TX: Harcourt Brace College Publishers.
- Harasim, L., Hiltz, S. R., Teles, L., & Turoff, M. (1995). *Learning networks: A field guide to teaching and learning online*. Cambridge, MA: MIT Press.

- Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, 5(1), 14-37.
- Oshima, J., Bereiter, C., & Scardemalia, M. (1995). Information-access characteristics for high conceptual progress in a computer-networked learning environment. In J. L. Schnase & E. L. Cunnis (Eds.), *Proceedings of CSCL '95: The first international conference on computer support for collaborative learning* (pp. 259-267). Mahwah, NJ: Lawrence Erlbaum Associates.
- Polanyi, M. (1966). *The tacit dimension*. Garden City, N.Y.: Doubleday & Co.
- Reeves, T. C., & Okey, J. R. (1996). Alternative assessment for constructivist learning environments. In B. G. Wilson (Ed.), *Constructivist learning environments: Case studies in instructional design*. Englewood Cliffs, NJ: Educational Technology Publications.
- Riel, M. (1994). Educational change in a technology-rich environment. *Journal of Research on Computing*, 26 (4), 452-474.
- Schank, R. C. (1994). Why hitchhikers on the Information Highway are going to have to wait a long time for a ride. *The Aspen Institute Quarterly*, 6 (2), 28-58.
- Siegel, M. A., & Sousa, G. A.. (September, 1994). Inventing the virtual textbook: Changing the nature of schooling. *Educational Technology*, 34 (7), 49-54.
- Soloway, E., Guzdial, M., & Hay, K. (1994). Learner-centered design: The challenge for HCI in the 21st century. *Interactions*, 1 (2), 36-48.
- Sternberg, R. J. (1985). *Teaching critical thinking, part 1: Are we making critical mistakes?* Phi Delta Kappan, 67, 194-198.

Sternberg, R. J., Forsythe, G. B., Hedlund, J., Horvath, J. A., Wagner, R. K., Williams, W. M., Snook, S. (eds.) (2000). Practical intelligence in everyday life. Cambridge University Press.