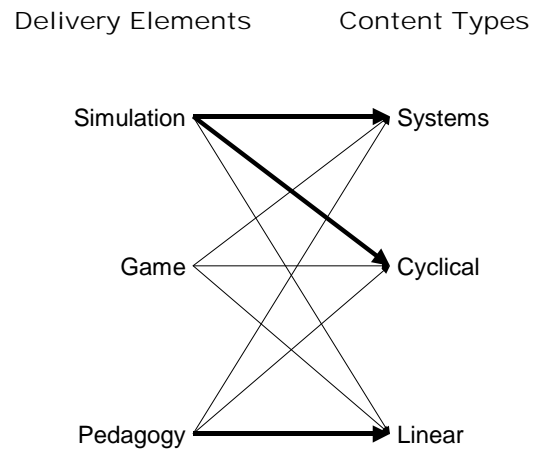


Clark Aldrich's Six Criteria of an Educational Simulation

The more I build, evaluate, and discuss educational simulations, the more I realize we need to establish some better terms. Specifically, there are six criteria that are emerging as critical, and ultimately not just to simulations but all educational experiences.

Three criteria, *linear*, *systems*, and *cyclical*, describe *content*. And three, *simulation*, *game*, and *pedagogy*, describe *delivery*.



Six Criteria of an Educational Simulation

Linear Content

We are most familiar with *linear* content. Here we present learners with inevitable sequences, with one event or step following the next. Striking a match produces fire. World War I came before World War II.

Systems Content

The second type of content deals with *systems*. Here, users are exposed to formal, complex, intertwined relationships. This includes all of the *components* of the system and how those *components impact each other*. *Systems content* is more accurate than *linear*, but where linear works, stick with it.

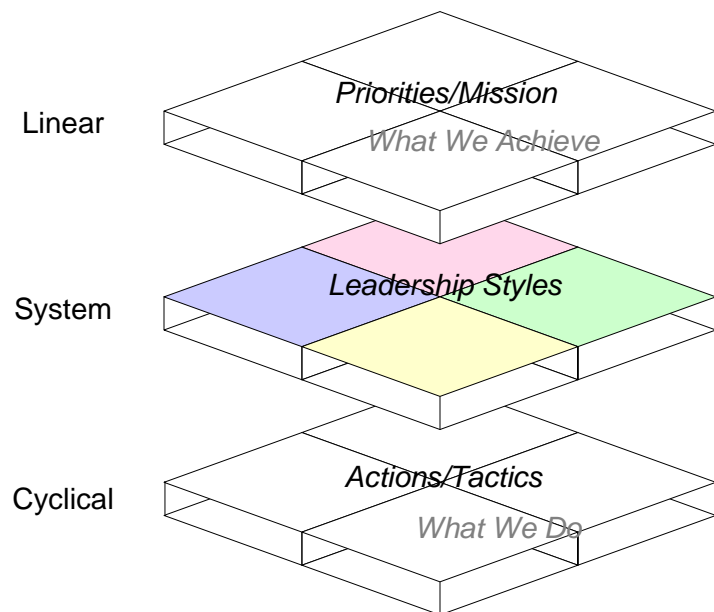
Cyclical Content

The third type of content, *cyclical*, addresses tiny activities that can be infinitely combined to create an outcome. These bundles of *discrete action*, *timing*, and *magnitude* are a natural concept to us when understanding how to operate a machine like a car, communicate by using a typewriter, or even perform with a piano. The opportunity, however, is to move beyond these kinesthetic examples to create, through the interfaces, cyclical content for all professional skills.

Leadership Content

Example

So how do these content types fit together in a real educational experience? Here's how we organized the content in SimuLearn's *Virtual Leader* simulation.



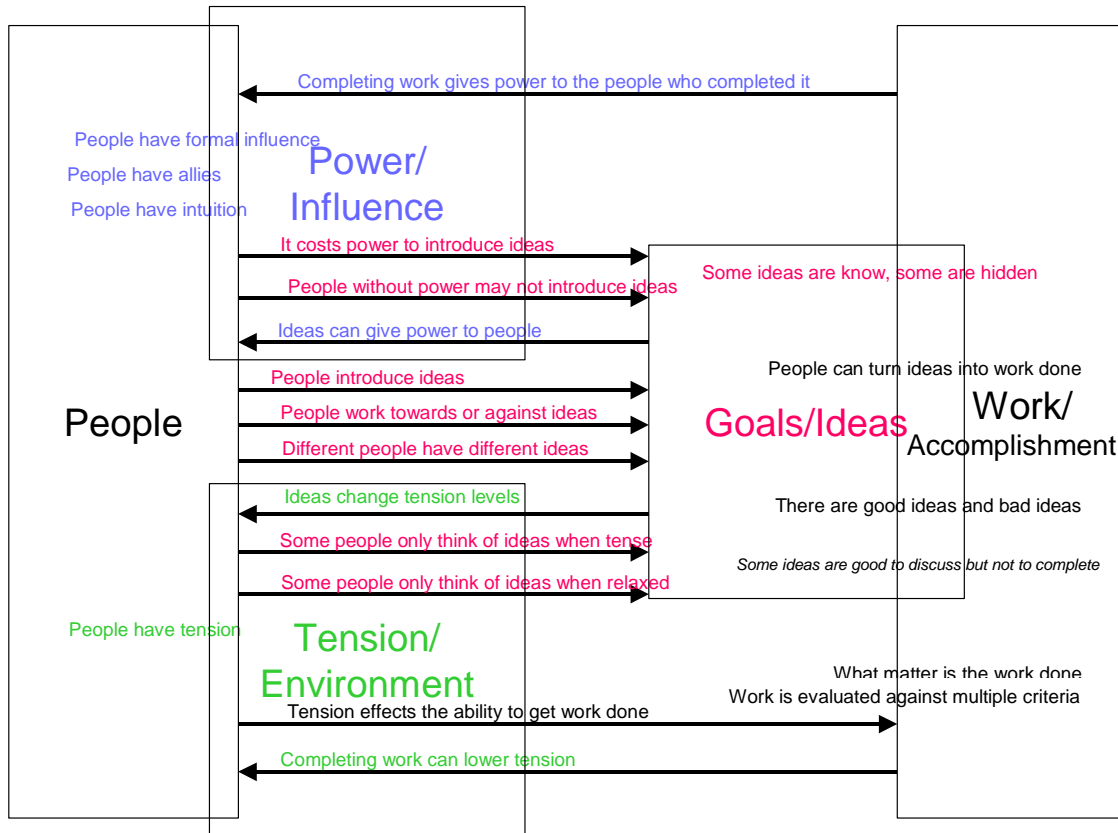
Virtual Leader Content Structure

Leadership is interesting, I hope, because we all have experienced it at both the giving and receiving end, and many of us have read various articles and books on it. Most importantly, learning leadership requires successfully learning all three types of content.

From a *systems* perspective, leadership requires the balancing of multiple interconnections. Four that are critical are: gaining and sharing *power* and influence, introducing and

soliciting new *ideas* and goals, proactively modifying the *tension* in the environment, and, of course, getting the right work done in a timely way.

These need to be balanced, because they all impact each other. Just some of the relationships as shown here:



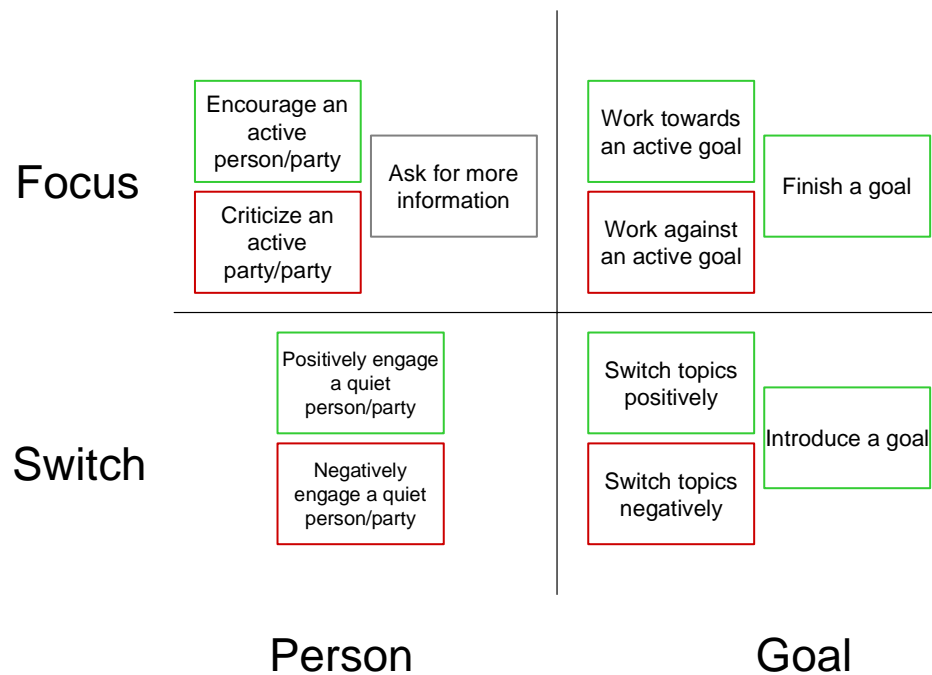
Virtual Leader Systems Content

Many “experts” have put linear labels on pre-canned formulas for negotiating these leadership systems. Here are some examples.

- Being *directive* means getting work done quickly and preventing alternative ideas from surfacing.
- Being *empowering* or *delegating* means pulling back on your own influence, building competencies in others, while accepting that the result might be different than what you had in mind and take longer to complete as well.
- Being *transactive* means trading influence or power to accomplish something.

But the problem with all of these pre-canned strategies is not only that our initial reads are often inaccurate, but also leadership situations change moment by moment. What starts as needing a *directive* approach may detour into requiring another leadership style, say, *participative*. It is only by constantly monitoring the leadership *system* that we can predictably and successfully influence it. (And only by successfully influencing it can we achieve outcomes that will be measured favorably against criteria, personal and enterprise, day-to-day and transformational.)

Next, leadership requires actually *interfacing* with the world (and, to practice, with the simulation). This is the *cyclical* content. Here's a chart of some of the discrete actions in a leadership situation:



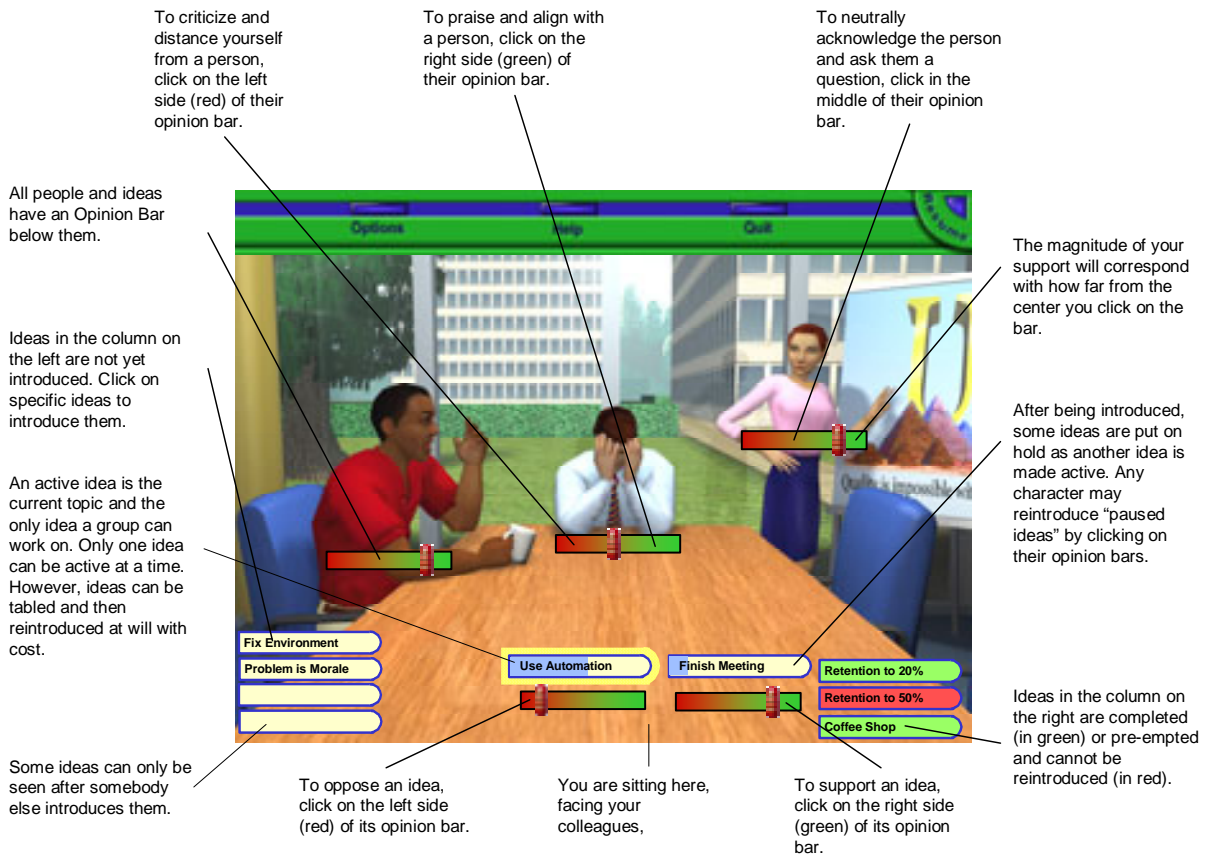
Virtual Leader Cyclical Content

Each action can also be done at different magnitudes. For example, consider how you might introduce an idea/goal:

- Introducing an idea with force establishes it as your idea. You attach some of your credibility to it. You get credit if it is agreed to, and later if it works. If you are the CEO in some conditions, the senior team falls into place in support of it, and alternatives are never surfaced.

- But if you introduce the same idea softly, you can separate it from you. People will debate it on its own, consider alternatives, and possibly even build up some momentum against it. If it succeeds, no one even remembers how the idea came up. But it also may succeed exactly because the participants thought of it as their idea.

Both approaches to introducing are valid. Reading the leadership system would dictate the approach. Here's how the interface was built to support the cyclical content:



Virtual Leader Cyclical Content

Finally, formally learning leadership requires linear content. Linear content provides the set up to each play. What is the problem that needs to be resolved? What does the starting condition look like?

Then, after the play, the simulation evaluates results across multiple linear scales. How well did the player meet the objectives? When striving towards a transformational goal, how did the player do? How well was the need for innovation

met? Or exceptional customer value? Or personal integrity?
And how was that balanced against more traditional goals
such as market share and profitability?

Simulation Elements

The most successful educational experiences also are delivered through a combination of the three *delivery elements*, simulation, game, and pedagogical. Getting it wrong with any of the three can cripple an experience.

Simulation elements model reality. Specifically, they can rigorously but selectively represent objects or situations, and can rigorously but selectively represent user interaction. Different simulation elements enable discovery, experimentation, concrete examples, practice, and active construction of systems, cyclical, and linear content. People who learn via simulation elements have a deep and flexible understanding of the material. But too much simulation creates a very dry and often frustrating experience.

Simulation Elements
<ul style="list-style-type: none">■ <i>Appropriately used linear, cyclical, and systems content</i>■ Use of simulation genres, including branching stories, virtual products/ virtual labs, interactive spreadsheets, flight simulator; and 3D maps, as well as <i>new genres</i> to be introduced■ <i>The appropriate use genre elements, including modeling, AI, graphics, and interface</i>■ <i>Creating an atmosphere similar to the atmosphere in which the content will be used</i>■ <i>Presenting behavior to be modeled or recognized</i> (Most narratives, instructions, and case studies have a non-interactive simulation aspect, although focusing primarily on linear content)■ <i>Feedback from a decision (or series of decisions) that shows the natural consequences of the behavior</i>

Game Elements

Game elements provide familiar and entertaining interactions. Game elements increase the enjoyment derived from an

educational experience. This can drive good will, but more importantly, drive more time spent with the experience, which increases learning. Game elements can surround the other content, and controversially, make it easier or more dramatic. Game elements reduce the need of instructors to "lean" on students, and lower pressure, but too much of it distracts from or waters down the learning.

Game Elements
<ul style="list-style-type: none">■ <i>Simplified or abstract interfaces</i>■ Use of established game genres (game shows, athletic competitions, computer games, card games)■ Clicking as quickly as possible■ Gambling models■ <i>Certain exaggerations of responses to make play more fun</i>■ Reliving the roles of heroes or role-models■ Conflict■ Shopping■ <i>A pause button</i>■ A speed-up/slow down switch■ <i>A replay option</i>■ <i>Creating order from chaos</i>■ Choosing your on-screen character's appearance or <i>voice</i>■ Mastering a simple cyclical skill (throwing a card into a hat, Pacman)■ <i>Competition between learners, including facilitated by maintaining lists of high scores</i>■ <i>Accessible communities for competition, and/or sense of belonging</i>■ Presenting a mystery or puzzle to solve■ <i>Making the player overly powerful or overly relevant in a resolution of a situation</i>■ Choosing between multiple skill levels to better align difficulty with capability

Pedagogical Elements

Pedagogical or didactic *elements* surround the game and simulation elements, ensuring that the students' time is spent productively. They better know what is going on and where to

focus their energies. Pedagogical elements in real-life include speedometers, caller ID, and the warning on certain cars that a “Student Driver” is operating them.

In educational experiences, pedagogical elements also help the learners avoid developing superstitious behavior, such as believing they are influencing something by a particular action when they are really not. If there are too many pedagogical elements, however, the learners feel they are engaging a manual, or mindlessly following directions.

Pedagogical Elements
<ul style="list-style-type: none">■ <i>Background material (including case studies, visual or text representations of systems models, and descriptions of interfaces to be encountered)</i>■ <i>Scaffolding (letting the learner know what is going on and give suggestions, either through voice or graphics)</i>■ <i>Diagnostic capabilities (including scoring)</i>■ <i>Visualization of relationships</i>■ Debriefing■ Forced moments of reflection■ Libraries of successful and unsuccessful plays■ <i>Links to chat rooms where people can brag about how they achieved a high score</i>■ Tests and quizzes■ Acronyms or other mnemonic devices to trigger memory of processes■ Coaching■ Pop-up prompting and help

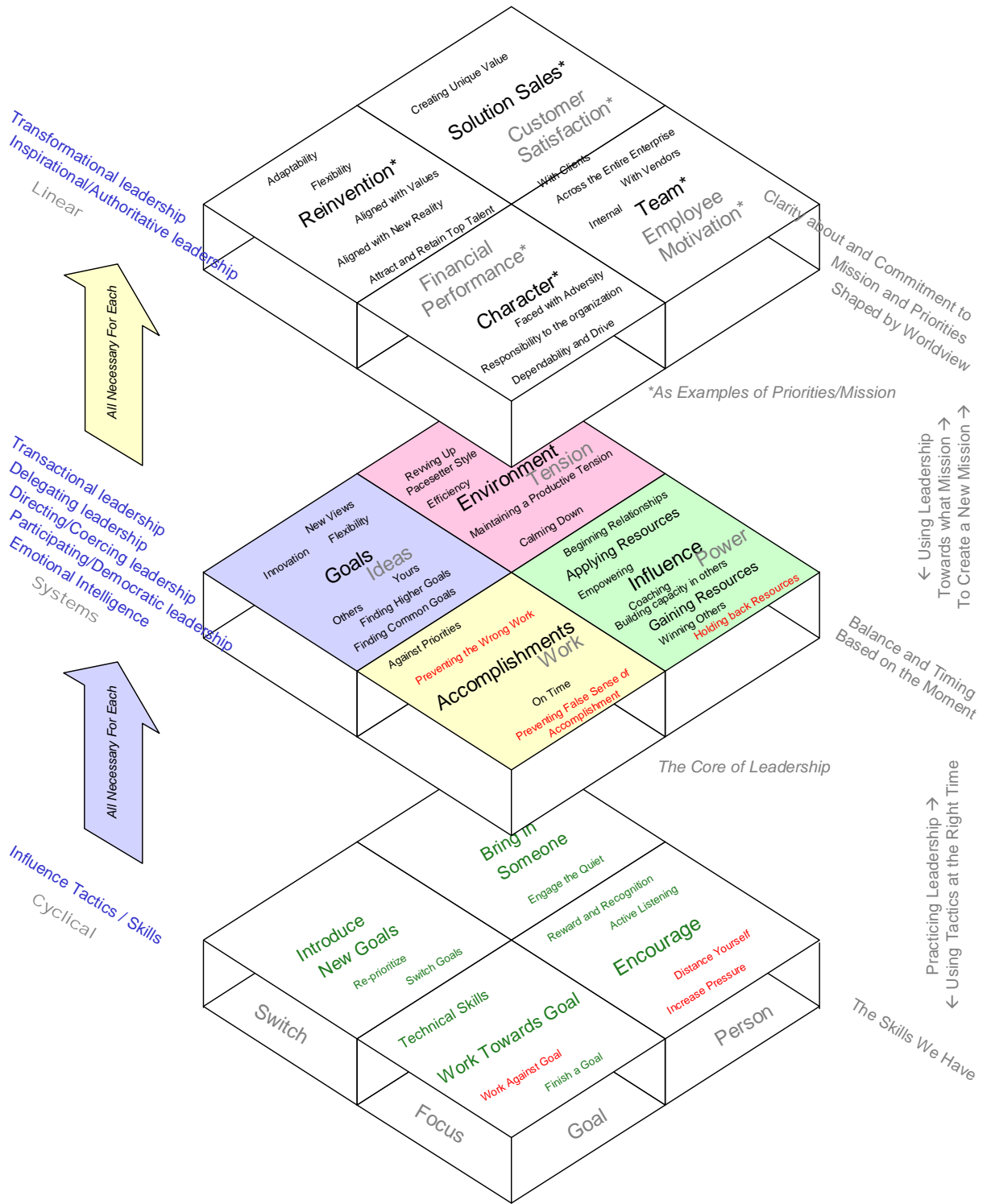
Virtual Leader Example

Redux

I have *italicized* those items in the simulation, game, and pedagogical lists of elements above that we used for the *Virtual Leader* simulation. Here are some specific examples in context:

Simulation elements in *Virtual Leader* include primarily the systems, linear, and cyclical simulation content mentioned before (and visualized all together below), but also the linear

situational introduction to each scenario and the linear, customized story results after the scenario.



Virtual Leader Simulation Elements Enable Learners to See and Engage Linear, Systems, and Cyclical Content which Selectively Models Leadership Environments

Game elements in *Virtual Leader* include: online scores (for high score competition); some entertaining quotes; and playing an increasingly important person, moving from the basement room to the boardroom:



A Game Element from Virtual Leader

Pedagogical elements in *Virtual Leader* include: introductory material explaining the theory, relevance, and how to use the simulation; dynamic charts showing relationships of power/influence and tension during the play; a suite of diagnostic scores; and ten end-of-meeting charts, such as this one:



A Pedagogical Element from Virtual Leader

Conclusion

The nice part of understanding simulations is that they help us understand all educational experiences. As we understand pedagogy and linear content, we first mourn that they have become so dominant, but then realize how powerful they are

in concert. It is only through all six do we start getting results that can truly change people.

About the Author



Clark Aldrich is the internationally acclaimed e-learning analyst and consultant serving dozens of Global 1000 clients. He is also the lead designer of SimuLearn's *Virtual Leader*, awarded *Best Online Product of the Year, Training Media Review/T+D magazine, 2004* (www.simulearn.net), and author of hundreds of articles, chapters, keynotes, reports, and columns, as well as the books *Simulations and the Future of Learning* (Pfeiffer, 2004) and the upcoming *Learning by Doing: The Essential Guide to Simulations, Computer Games, and Pedagogy in E-Learning and other Educational Experiences* (Pfeiffer, 2005). He has been identified as an "E-learning Guru" by Fortune Magazine, "Visionary of the Industry" by Training Magazine, and a member of "Training's New Guard" by the American Society of Training and Development. Mr. Aldrich has been used as an e-learning and simulation subject matter expert by *The New York Times*, *Wall Street Journal*, *CNET*, *Business 2.0*, *CNNfn*, *U.S. News and World Reports*, and many others. Previously, he was the research director that had created and was topic leader for Gartner Group's e-learning coverage. He can be reached at clark.aldrich@att.net.

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