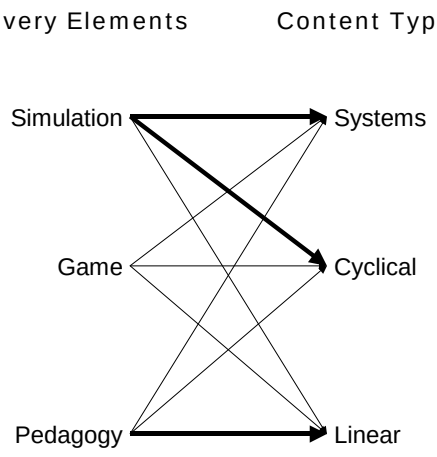
Clark Aldrich's Six Criteria of an Educational Simulation

The more I build, discuss, and evaluate 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.

The first three, *linear*, *systems*, and *cyclical*, describe content. And the second three, *simulation*, *game*, and *pedagogy*, describe delivery.



Content Types

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 but after the United State's Civil War.

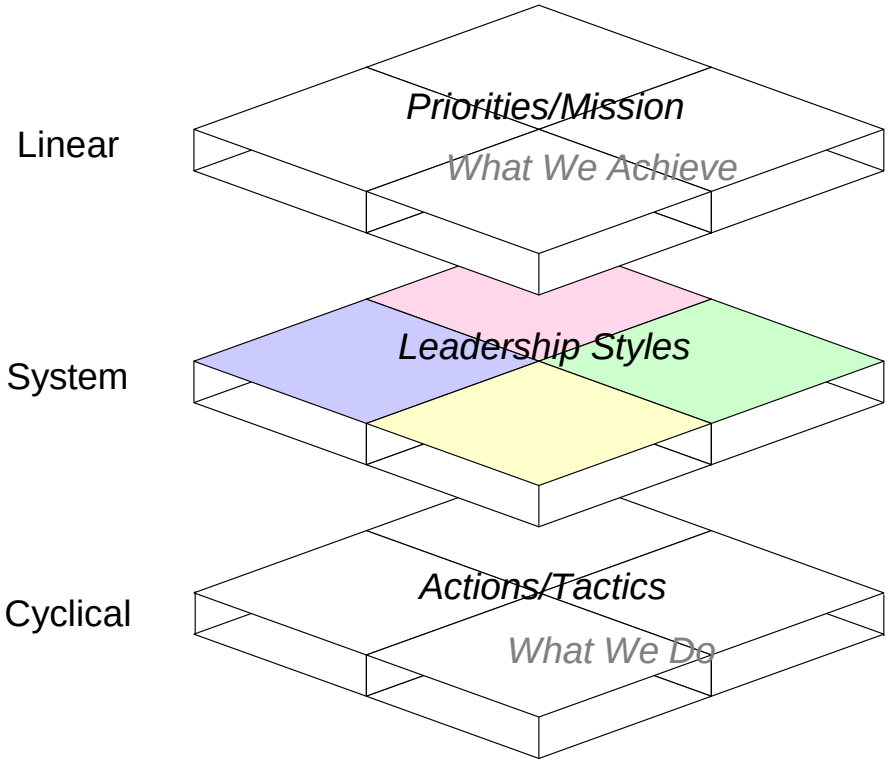
The second type of content deals with *systems*. Here, users are exposed to formal, complex, intertwined relationships. This content describes the variables of the system and how those variables affect each other. Systems are everywhere as we learn to see them, from food webs to balances between compensation, employee morale, and employee retention. *Systems content* is to *linear* what *quantum physics* is to *Newtonian* - more accurate, but where the simpler works, stick with it.

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 when understanding how to operate a machine like a car or camera, communicate by using a typewriter, or even entertain with a marionette or a violin. The opportunity is to move beyond these understood frameworks to create the taxonomies and interface of cyclical content wherever it is appropriate, including around almost every hard and soft skill.

Leadership Example

So how do these content types fit together in a real educational experience? Here's how we organized the content in the simulation Virtual Leader. It is interesting, I hope, because we all have experienced it at both the giving and receiving end, and some of us have read various articles and books on it.

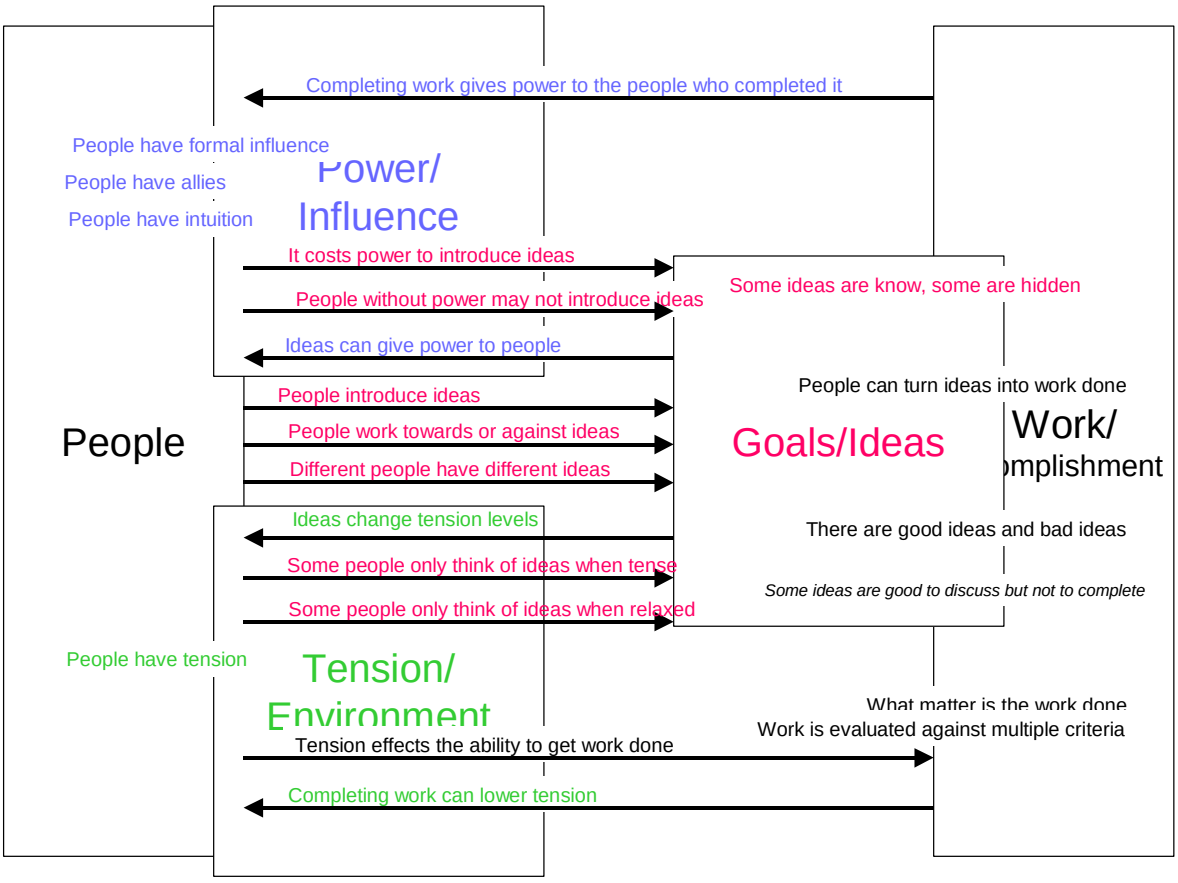
Learning leadership requires linear content. Linear content provides the set up to each experience. What is the problem that needs to be resolved? What does the starting condition look like?



Then, the post-experience scoring is also linear. 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?

From a systems perspective, leadership requires the balancing of multiple, interconnected aspects. 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 affect each other, as shown here:

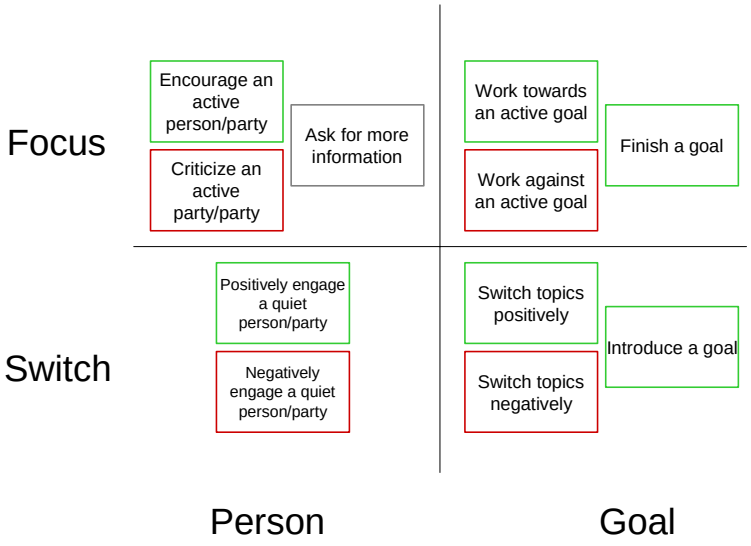


Many have put linear labels on pre-determined and pre-canned formulas for negotiating these leadership systems. For example, being *directive* means getting work done quickly and preventing alternative ideas from surfacing. Being *empowering* or *delegating* means pulling back on your own influence, 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 inevitably inaccurate, but leadership situations change moment by moment. What starts as needing a directive approach may detour

into being participative. It is only by understanding and constantly monitoring the leadership *system* that we can 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.)

Finally 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 and options in a leadership situation:

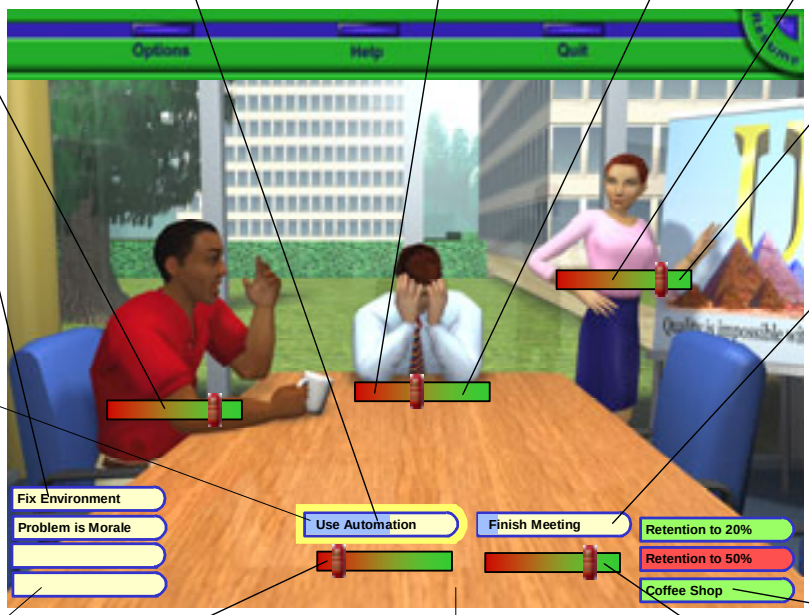


Each action can also be done at different magnitudes. For example, consider how you might introduce an idea/goal:

- Introducing an idea with force establishes it as your idea. You put some of your credibility behind it. You get credit if it is agreed to, and later if it works. If you are the CEO, the senior team falls into place in support of it, and alternatives are never surfaced.
- But if you introduce the same idea softly, you will not associate it with 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.

Here's how the interface was built to support the cyclical content:



All ideas also have blue progress bars. When these bars are filled, the idea is completed and moves to the right side column.

To criticize and distance yourself from a person, click on the left side (red) of their opinion bar.

To praise and align with a person, click on the right side (green) of their opinion bar.

To neutrally acknowledge the person and ask them a question, click in the middle of their opinion bar.

All people and ideas have an Opinion Bar below them.

The magnitude of your support will correspond with how far from the center you click on the bar.

Ideas in the column on the left are not yet introduced. Click on specific ideas to introduce them.

After being introduced, some ideas are put on hold as another idea is made active. Any character may reintroduce "paused ideas" by clicking on their opinion bars.

An active idea is the current topic and the only idea a group can work on. Only one idea can be active at a time. However, ideas can be tabled and then reintroduced at will with cost.

Ideas in the column on the right are completed (in green) or pre-empted and cannot be reintroduced (in red).

Some ideas can only be seen after somebody else introduces them.

To oppose an idea, click on the left side (red) of its opinion bar.

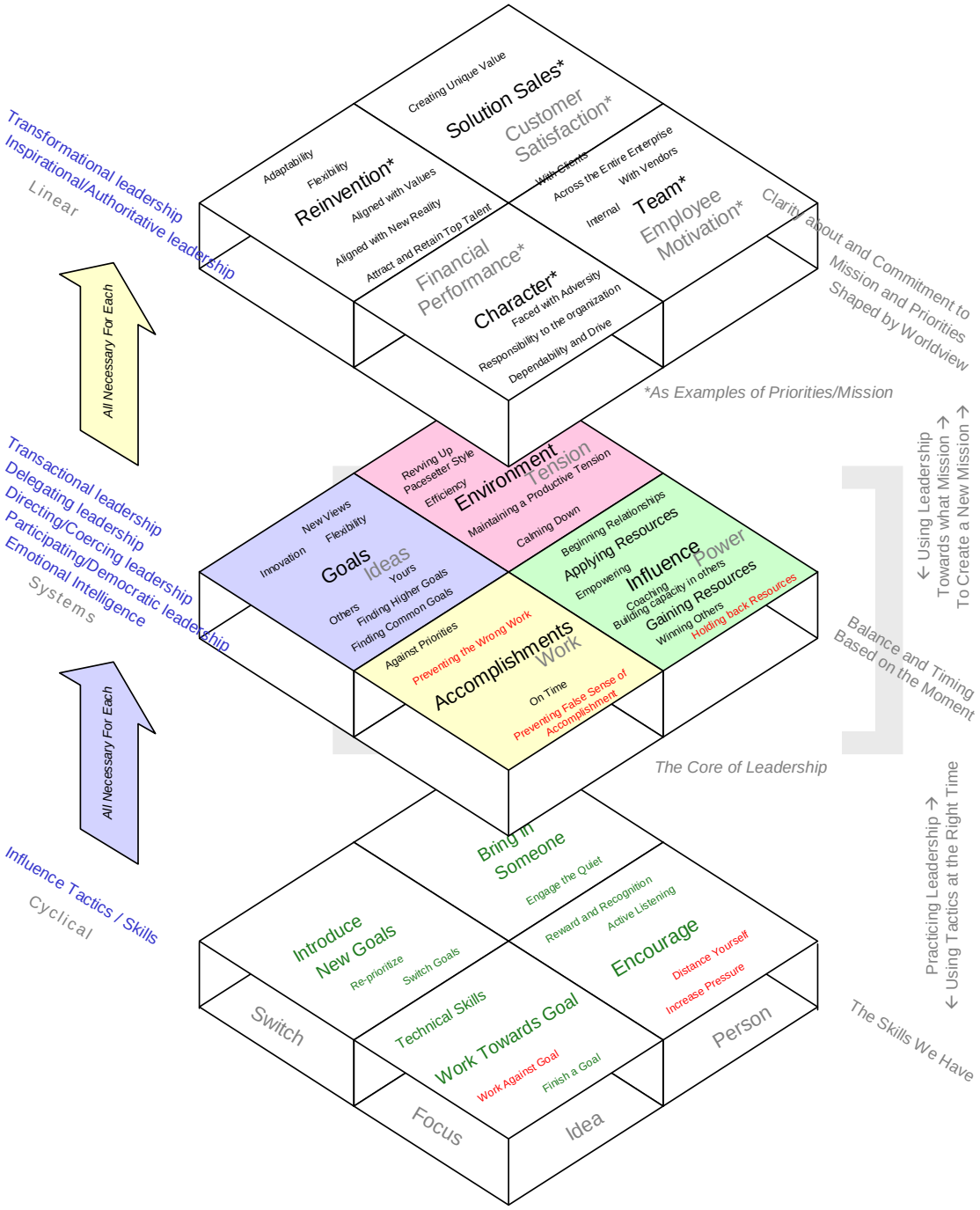
You are sitting here, facing your colleagues,

To support an idea, click on the right side (green) of its opinion bar.

Summary of Content

Across Types

A summary of leadership with regards to the three types of content looks like this:



Delivery Elements

Successful educational experiences also represent the 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 experience.

Simulation Elements

- Appropriately used linear, cyclical, and systems content
- Simulation genres, including branching stories, virtual products/ virtual labs, interactive spreadsheets, flight simulator; and 3D maps, as well as new genres to be introduced
- The appropriate use genre elements, including modeling, AI, graphics, and interface
- Creating an atmosphere similar to the atmosphere in which the content will be used
- Presenting behavior to be modeled or recognized
- Feedback from a decision (or series of decisions) that shows the natural consequences of the behavior

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

- Simplified or abstract interfaces
- Use of established game genres (game shows, athletic competitions, computer games, card games)
- Clicking as quickly as possible
- Gambling models
- Certain exaggerations of responses to make play more fun
- Reliving the roles of heroes or role-models
- Conflict
- A pause button
- Shopping
- Creating order from chaos
- Choosing your on-screen character's appearance
- Mastering a simple cyclical skill (throwing a card into a hat, PacMan)
- Competition between learners, including facilitated by maintaining lists of high scores
- Accessible communities for competition, and/or sense of belonging
- Presenting a mystery or puzzle to solve
- Making the player overly powerful or overly relevant in a resolution of a situation
- Choosing between multiple skill levels to better align difficulty with capability

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 nametags, 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
■ Background material (including case studies, visual or text representations of systems models, and descriptions of interfaces to be encountered) ■ Scaffolding (letting the learner know what is going on and give suggestions, either through voice or graphics) ■ Diagnostic capabilities (including scoring) ■ Visualization of relationships ■ Debriefing ■ Forced moments of reflection ■ A speed-up/slow down switch ■ A replay option ■ Libraries of successful and unsuccessful plays ■ Links to chat rooms where people can brag about how they achieved a high score ■ Tests and quizzes ■ Acronyms or other pneumonic devices to trigger memory of processes ■ Coaching ■ Pop-up prompting and help

Here are examples of each in our leadership simulation example:

The *simulation elements* include the linear situational introduction to each scenario, the linear, systems, and cyclical simulation content mentioned before, and the linear, customized story continuation after the scenario.

The *game elements* include: overall scores (for high score competition), some entertaining quotes, and

playing an increasingly important person, ultimately influencing the future of a large enterprise.

The *pedagogical elements* include: diagnostic scores, end of meeting charts, dynamic charts showing relationships during the play, and introductory material explaining the theory, relevance, and how to use the educational simulation.

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 has 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 (Best Online Product of the Year, Training Media Review/T+D magazine, 2004), 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: Simulations, Computer Games, and Pedagogy* (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. Previously, he was the research director that had

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