

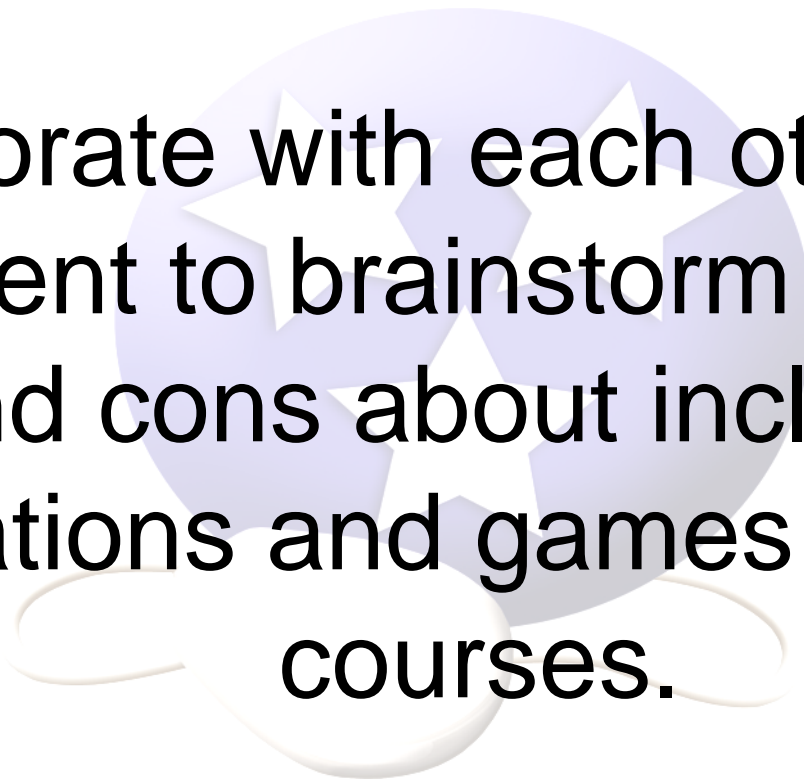
Deepening Learner
Understanding
via
Games and Simulations
in Online Courses



Presenter:
David Gale
November 6, 2007

Brainstorm

Collaborate with each other for a moment to brainstorm the pros and cons about including simulations and games in on-line courses.



Games and Simulations

- **Should we incorporate them into on-line courses? Why?**
- **What purpose could they serve in relation to the rest of the on-line course material?**
- **What is the instructional value of them?**
- **Are they able to serve any instructional purposes better than other on-line teaching methods available in the e-learning classroom?**

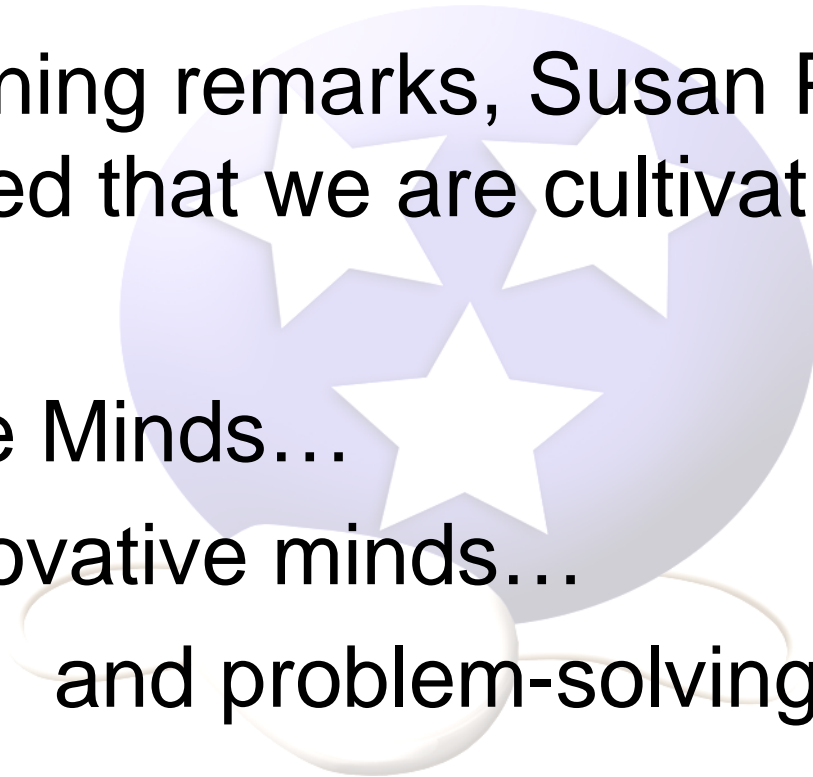
e-learning doesn't end with direct instruction...

In her opening remarks, Susan Patrick
mentioned that we are cultivating

Creative Minds...

innovative minds...

and problem-solving minds



Games and Simulations

The underlying reason for using games and simulations in on-line courses can be summed up by this quote...

“Tell me and I will forget.

Show me and I may remember.

Involve me and I will understand.”

~ Chinese Proverb

Cognitive Learning Theories tell us...

- 1. Cognitive processes influence learning.**
- 2. People organize the things they learn.**
- 3. New information is most easily acquired when people can associate it with things they have already learned.**
- 4. People control their own learning.**

In our example...

By participating, manipulating and/or interacting with something, we open up the number of sensory pathways we use to help us make sense of it.

We increase the opportunities for higher order cognitive process when we are free to use our own curiosity, thinking processes, and patterns of logic to “figure it out.”

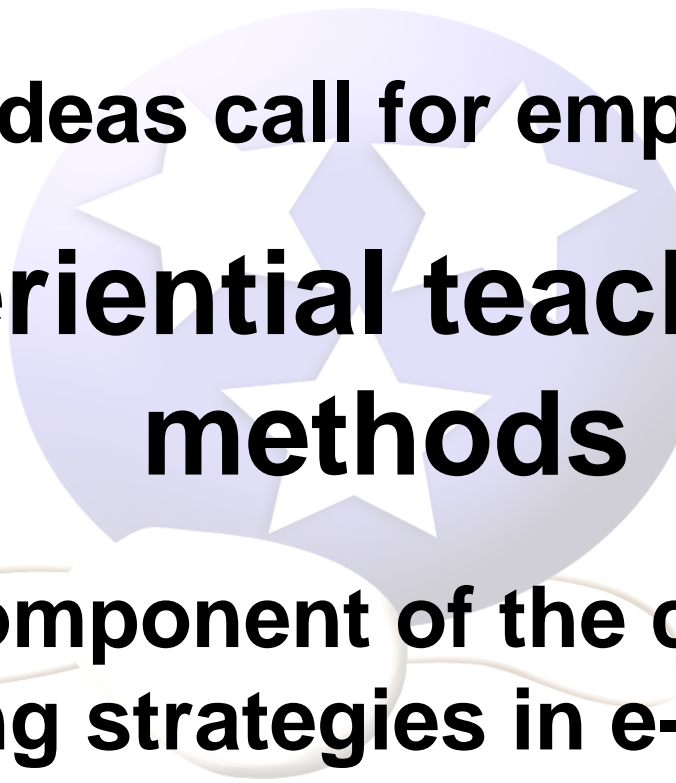
In our example...

Also, the prior knowledge that we possess provides cognitive anchor points for us to use in organizing and relating new information.

We increase the probability of achieving true understanding, retention, and transfer of new knowledge with the more connections we make in relating new information to already established knowledge.

So, to achieve the best learning results we need to...

- 1. Involve as many higher order cognitive processes as we can in e-learning.**
- 2. Give diverse e-learners more ways to organize and make sense of the things they are trying to learn.**
- 3. Provide diverse e-learners with experiential opportunities to create cognitive anchors with which to associate new information.**
- 4. Engage students so they are motivated to take an active role in their own learning.**



**These ideas call for employing
experiential teaching
methods**

**as one component of the cognitive
learning strategies in e-learning.**

Challenge for e-learning...

Incorporate significant experiential learning opportunities for students in e-learning environments.

Why?

Doing so will address more learning needs for students with diverse learner backgrounds and learning modalities.

Critics of e-learning often claim that on-line education relies too heavily on direct instruction, explicit teaching, and passive learning.

Criticism of e-learning...

“The primary shortcoming [of e-learning] is the courses are canned, relatively shallow treatments of topics, which doesn’t allow for exploratory learning or the depth that some topics require.”

– Jon Zeitler and K. Widelski, “Essentials and Eccentricities of E-learning” NOAA/NWS SR SSD 2004-08 Report.

Criticism of e-learning...

“... e-learning providers are mistaking the publishing of information for learning and training. Just taking a course [text]...and putting it into HTML is not the best of e-learning. That is really just about delivering reading through the network.”

- Elliott Masie – Head of the MASIE Center Learning Lab & ThinkTank

Efforts to address that criticism...

e-learning organizations have recently incorporated more...

- collaborative learning activities**
- virtual labs**
- virtual learning environments**

and other course elements in an effort to provide more experiential learning opportunities for e-learners.

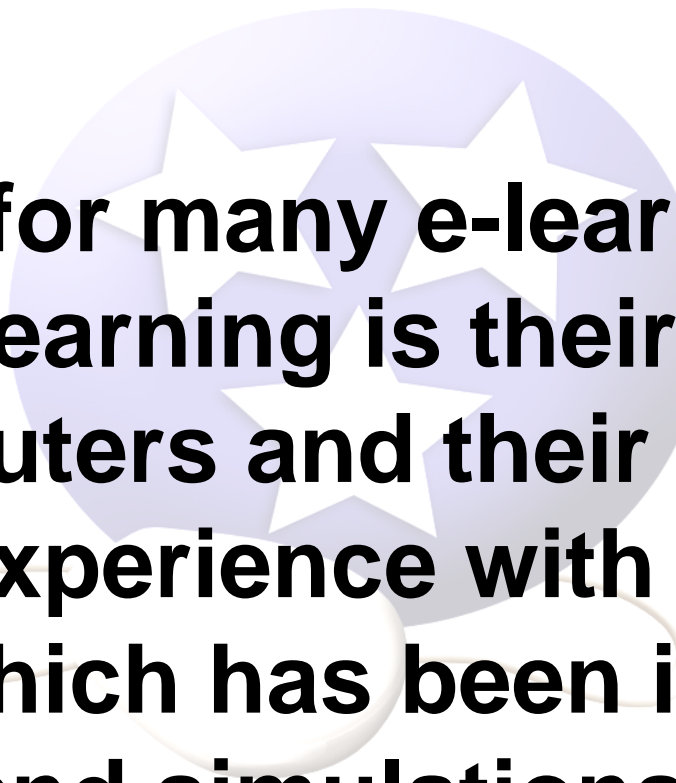
One area not yet fully embraced to expand experiential opportunities for e-learners is the use of...



**Games
and
Simulations.**

Games and Simulations

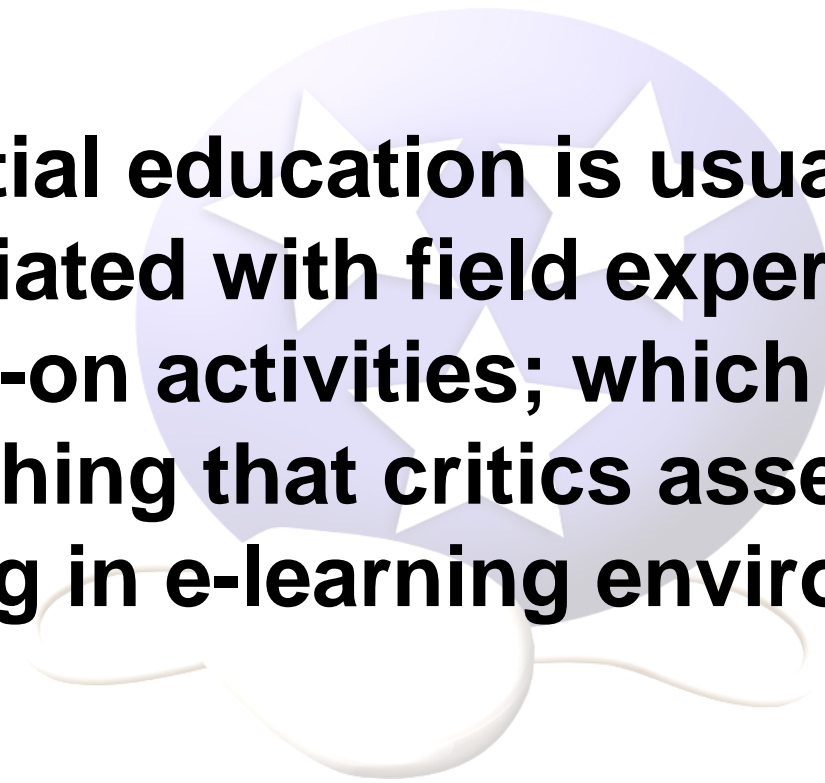
Ironically, for many e-learners, one draw to e-learning is their comfort with computers and their prior personal experience with them – much of which has been in the form of games and simulations.



Remember what experiential education is...

Experiential education is a philosophy and methodology in which educators purposefully engage with learners in direct experience and focused reflection in order to increase knowledge, develop skills and clarify values.

*Association for Experiential Education, 2007



Experiential education is usually associated with field experiences and hands-on activities; which is something that critics assert is often lacking in e-learning environments.

e⁴TN's Course Development

e⁴TN has adopted a course development model with the purpose of infusing experiential learning as an integral part of our students' learning experience. A significant part of this effort has been to utilize games and simulations to incorporate principles of experiential education into our courses.

Games and simulations & experiential education in e-learning...

There are many principles of experiential learning that games and simulations can address more effectively and more easily than can other types of instructional e-learning activities.

Principles of experiential education suited to games and simulations...

- **requiring the learner to take initiative, make decisions and be accountable for results**
- **actively engaging learners in posing questions, investigating, experimenting, being curious, solving problems, assuming responsibility, being creative, and constructing meaning throughout the learning process**
- **learning through experiencing success, failure, adventure, risk-taking and uncertainty, because the outcomes of the experience cannot totally be predicted**
- **providing an environment that encourages spontaneous opportunities for learning**
- **providing a learning experience that includes the possibility to learn from natural consequences, mistakes and successes**

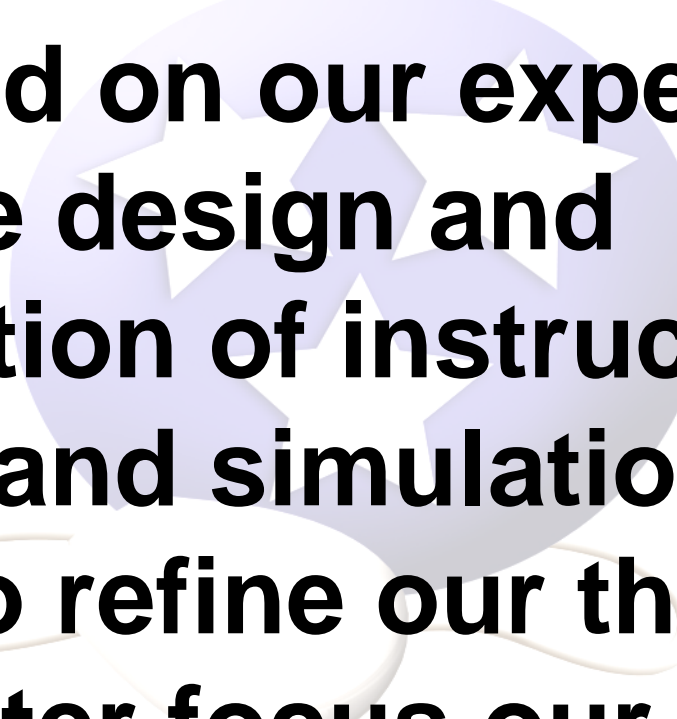
Our approach at e⁴TN ...

e⁴TN is including key aspects of experiential education into our on-line learning environment by incorporating instructionally sound and well-designed games and simulations in our courses.

Furthermore, we guarantee their instructional soundness in our courses because we build all of our games and simulations in-house.

By building all of our games and simulations in-house...

- **we are able to specifically design them to fit seamlessly as integral parts of our lessons, not as asides**
- **we are able to have teams of professional educators, programmers and artists collaborating closely together throughout the entire production process**
- **we are able to constantly test them, analyze their effectiveness, and refine them as needed**



At e⁴TN, we have carefully reflected on our experiences with the design and production of instructional games and simulations in order to refine our thinking and better focus our efforts for the benefit of our learners.

CBLAs

At e⁴TN we call our games and simulations, as well as our animated virtual coaches, animated custom graphics, course themes animations, and custom still graphics Computer Based Learning Activities (CBLAs).

CBLAs

CBLAs fall into two broad categories:

Passive CBLAs

and

Interactive CBLAs

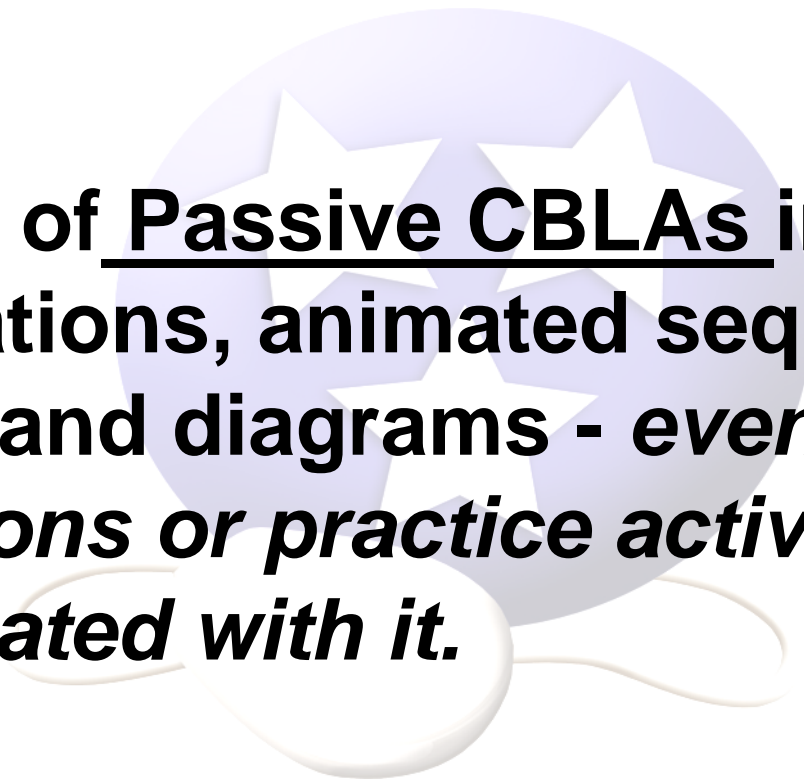


Passive CBLAs

Passive CBLAs are ones in which the student only watches, listens, or reads material, but does not input or manipulate anything substantive within the learning activity itself.

Passive CBLAs

Examples of Passive CBLAs include illustrations, animated sequences, maps, and diagrams - *even if there are questions or practice activities associated with it.*



Passive CBLAs

Passive CBLAs ask students to:

comprehend



Passive CBLAs

Examples of e⁴TN's Passive CBLAs:

Static Illustrations – Chloroplast (Biology)

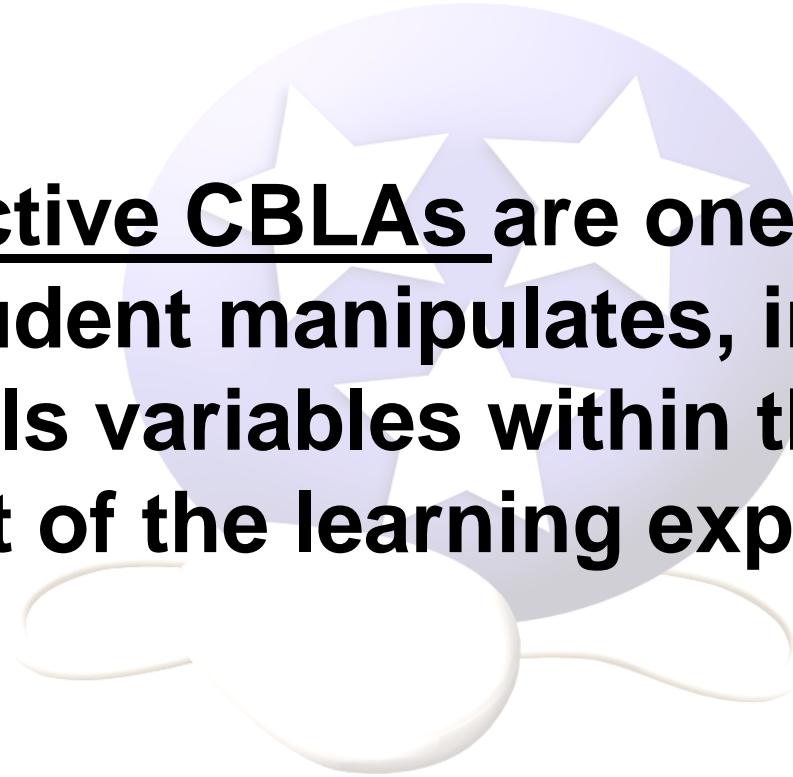
Animated Illustrations – SI System of Measurement (Chemistry)

Instructional or Theme Animations – English 10 Intro (Eng 10)

Examples accessible at <http://www.e4tn.org/cms/index.php?page=vss-presentation2>

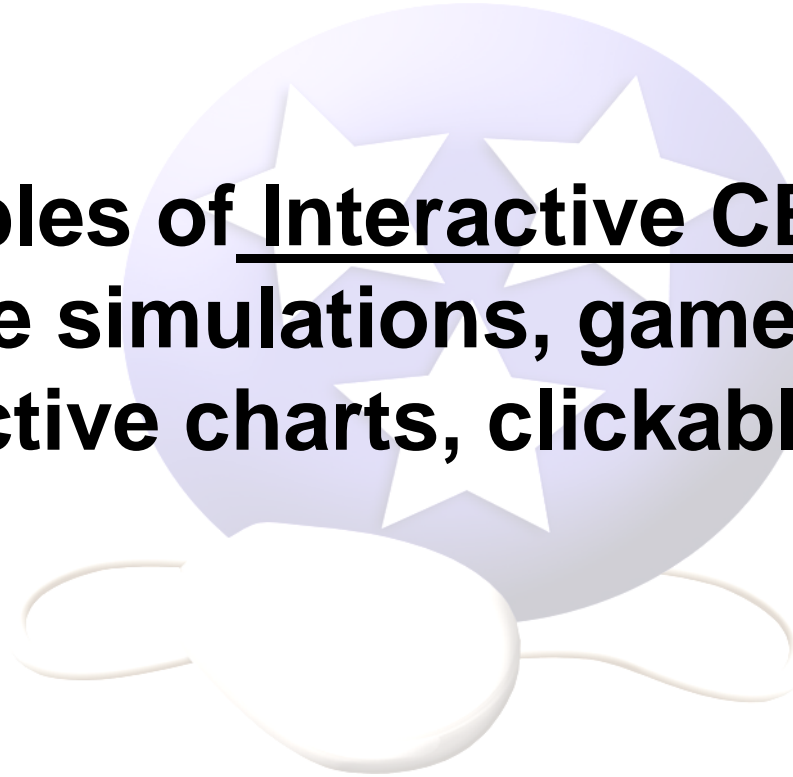
Interactive CBLAs

- **Interactive CBLAs are ones in which the student manipulates, inputs, or controls variables within the activity as part of the learning experience.**



Interactive CBLAs

- **Examples of Interactive CBLAs include simulations, games, interactive charts, clickable maps**



Interactive CBLAs

- Interactive CBLAs can be further subdivided into two general categories based on methods of student interaction:

Prescribed Interactive CBLAs

and

Exploratory Interactive CBLAs

Prescribed Interactive CBLAs

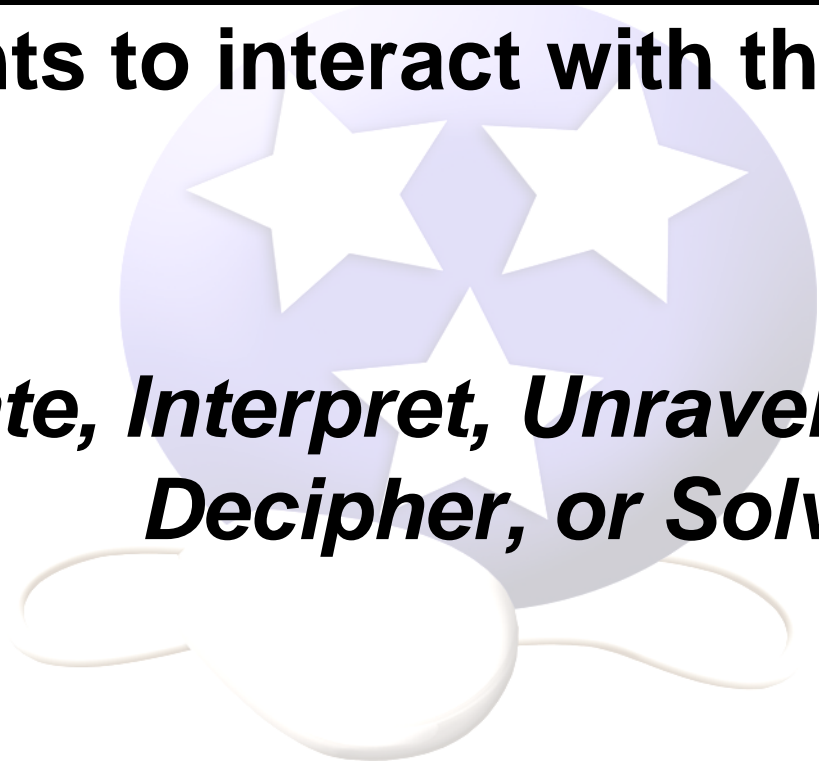
- **Prescribed Interactive CBLAs are activities that have pre-arranged settings which greatly limit or restrict students' possible pathways to success.**



Prescribed Interactive CBLAs

Prescribed Interactive CBLAs ask students to interact with the activity to:

Duplicate, Interpret, Unravel, Answer, Decipher, or Solve



Exploratory Interactive CBLAs

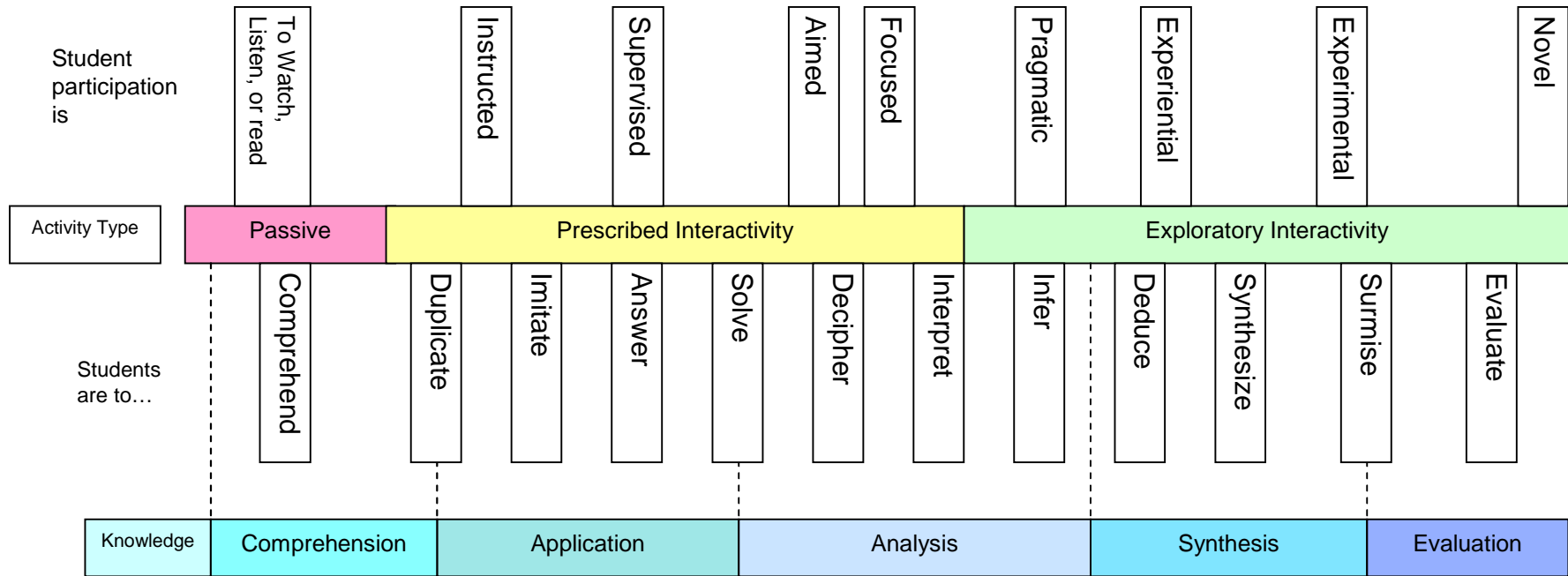
- **Exploratory Interactive CBLAs are activities that allow students the freedom to discover their own pathways to success through considering and testing a wide-array of possible courses of action.**

Exploratory Interactive CBLAs

- **Exploratory Interactive CBLAs ask students to interact with the activity to:**

***Infer, Deduce, Surmise, Synthesize,
and Evaluate***

CBLAs in Relation to Bloom's Taxonomy (Original)



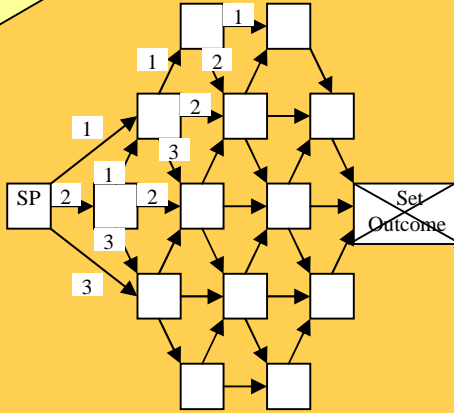
Bloom's Taxonomy: Orders of Cognitive Thought

Interactive CBLA Models

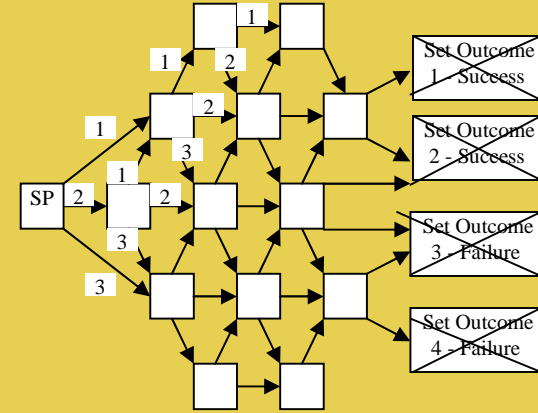
Prescribed Interactivite CBLAs



Single Path – Single Outcome



Multiple Paths – Single Outcome

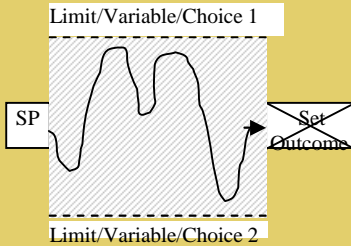


Multiple Paths – Multiple Outcomes

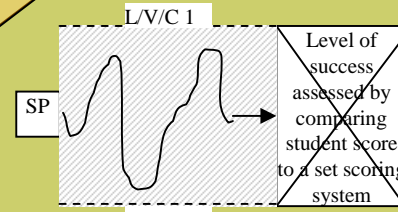
Exploratory Interactivite CBLAs

Key

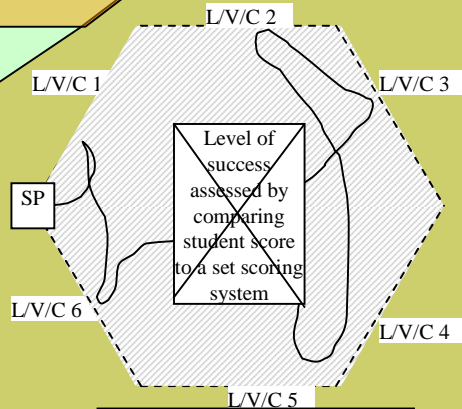
- = Direct Instruction/ Do Activity until *done satisfactorily*
- = Guided Instruction/ Do it to minimum proficiency
- = Self Instruction/ Do it until you are satisfied with results
- = scripted choices
- = Starting Point
- = End Point & nature of outcome
- = Scripted Choices
- = Limits, Variables, or Choices in Free Path or
- = Range of freedom of student choice in Free Path and No Path Models



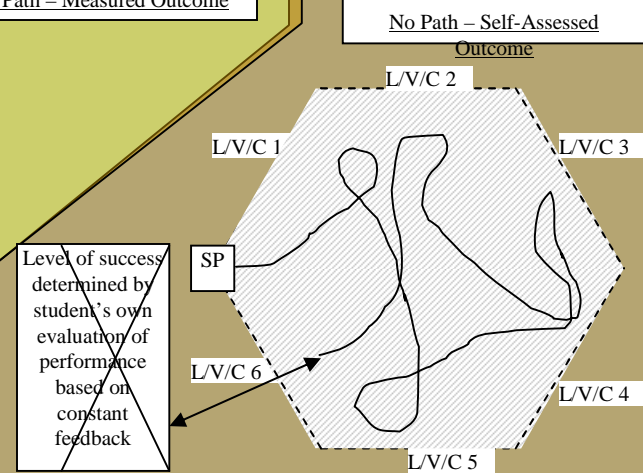
Free Path – Single Outcome



Free Path – Measured Outcome



No Path – Measured Outcome



No Path – Self-Assessed Outcome

Types of Prescribed Interactive CBLAs

Instructed: constrict student participation to making choices that involve the student being told to do something

Supervised: constrict student participation to making choices that are externally organized and/or controlled

Types of Prescribed Interactive CBLAs

Aimed: constrict student participation to making choices that involve pointing or sending the student in a particular direction

Focused: constrict student participation to making choices that involve the student's attention or concentration being directed on something

e⁴TN Examples of Prescribed Interactive CBLAs

***Instructed* – Directions Drag and Drop(Eng 9)**

***Supervised* – Classroom Interactivity (Spanish I)**

***Aimed* – Hand Tool Safety....(Innovations & Inventions)**

***Focused* – Potato Lab..... (Chemistry)**

Examples accessible at <http://www.e4tn.org/cms/index.php?page=vss-presentation2>

Types of Exploratory Interactive CBLAs

Pragmatic: students participate by making decisions that look at the features of past experiences with regard to the direct lessons that can be learned and applied to the same situations.

Experiential: students participate by making decisions in new situations based on lessons learned from various past experiences.

Types of Exploratory Interactive CBLAs

Experimental: encourages students to participate by making decisions that employ ideas, methods, or materials that have not been tried before

Novel: encourages students to participate by making decisions that use strategies that are new, original, and different, and often particularly interesting or unusual

e⁴TN Examples of Exploratory Interactive CBLAs

Pragmatic – Barter Simulation(Economics)

Experiential – Triangular Trade(World History)

Experimental – Comitatus.....(English 12)

Novel – Election Simulation (pre-alpha).... (*Economics*)

Examples accessible at <http://www.e4tn.org/cms/index.php?page=vss-presentation2>

Limits to games and simulations

It is extremely difficult to teach concepts only through “play.”

Without elements of direct instruction being built into the “game,” or other instructional strategies employed before and/or after the activity, many students never become cognizant of the point.

The more high-level the thinking involved in the activity, the greater the need for solid reflective & summative follow up activities.

Preliminary Data Supporting Retention

While our feedback from site coordinators, on-line instructors, lab facilitators, and students has been very positive about the evolution of our CBLAs, our statistical data is still very preliminary concerning the benefits.

Preliminary Data Supporting Retention

We conducted a test over the past two semesters.

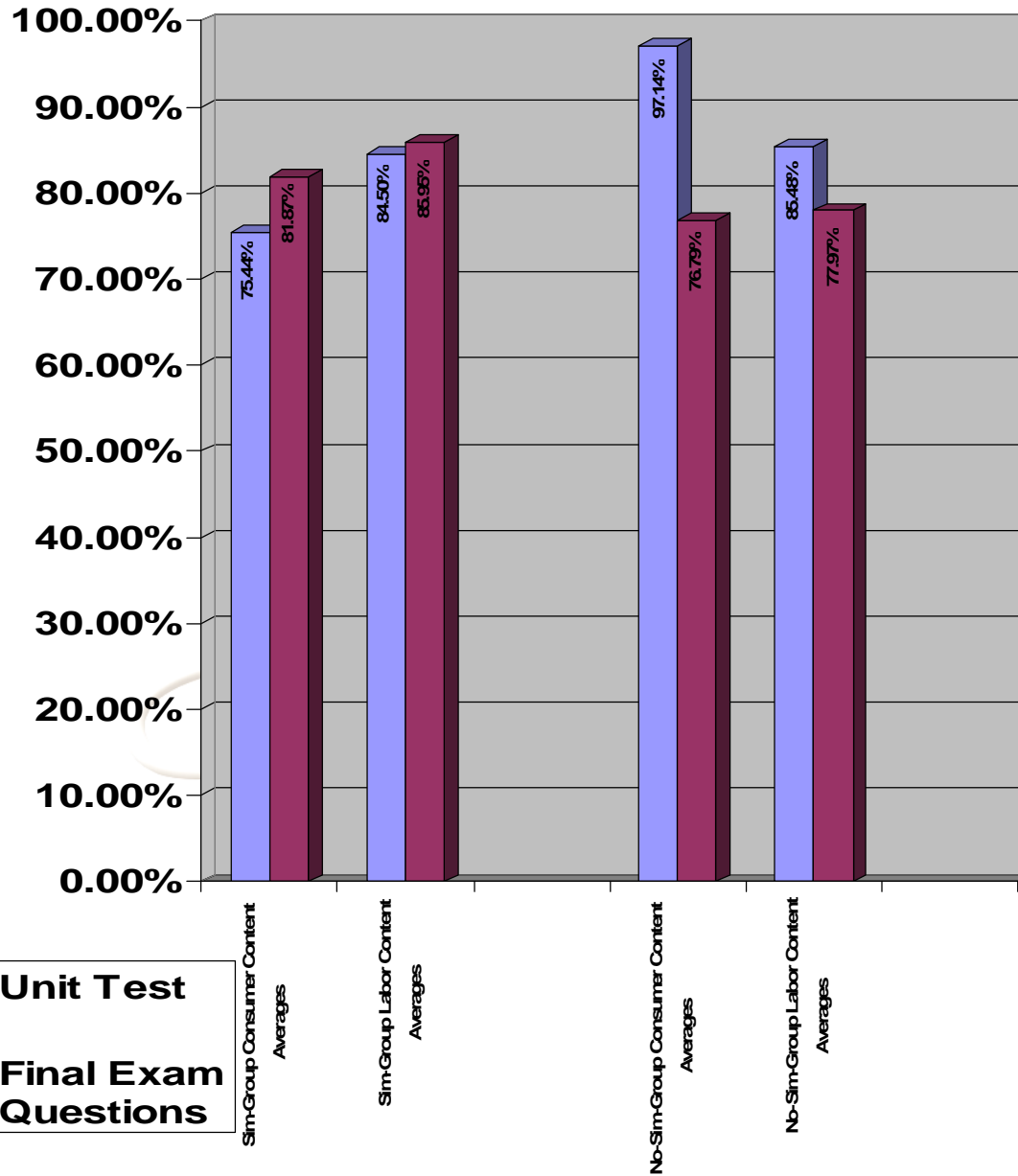
We took half of our economics sections and replaced some higher-level CBLAs with traditional instructional equivalent assignments, giving us two groups of students with the same instructional and assessment components, except for the CBLAs that had been replaced...

Preliminary Data Supporting Retention

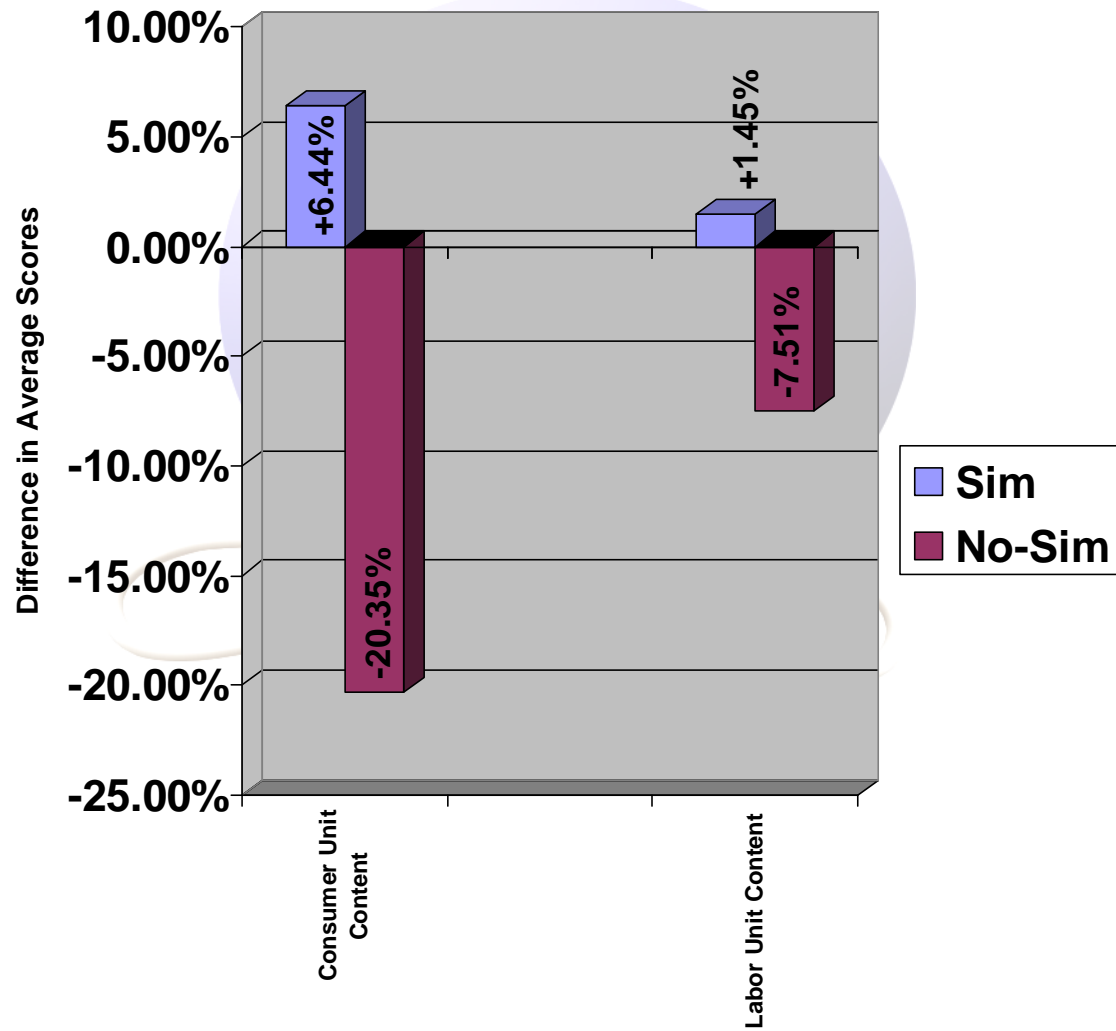
The units with these CBLAs occurred early in the course.

We compared the groups for retention between their accuracy on questions from the unit tests and their accuracy on final exam questions relating to information learned in those units...

Unit Test Averages & Final Exam Related Question Averages



Difference in Average Score on Unit Test vs. Final Exam Unit Content Related Questions



Brainstorm

Collaborate and think of how you would teach about Labor Supply and Demand in your current e-learning environment, and the ideal way you would teach it.

Labor Supply and Demand theory says that when the labor supply exceeds job demand, workers accept lower wages; when job demand exceeds labor supply, workers demand higher wages.

Summary

Using carefully designed and instructionally sound games and simulations as one component of our e-learning experience promotes deeper understanding, higher engagement levels, and more retention by better infusing greater elements of experiential education into our courses.

Deepening Learner Understanding
via
Games and Simulations
in Online Courses



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