Designing Student-Centered e-Learning Environments

A Grounded Approach

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Context

- With insufficient time, training, tools or incentives, educators rely on past practices.
- Many online courses continue to mimic teacher-directed or self-instructional correspondence mail models of DE.
Teacher Directed Methods

• Rely heavily on lecture-based materials that focus on the transmission of information
• Limited interactions resulting in feelings of isolation & anonymity
  • Do not promote social interactions to interpret & construct knowledge
    • Based on speaking and listening
    • Not engaging
    • Fail to use the potential of technology
Key Differences?

Traditional Instructor-led vs. Modern IDE Systems
Key Differences?

Spontaneity of Interactions

- interpret verbal and non-verbal cues
- clarify expectations
- address individual needs/concerns
  - provide insights & elaborations
  - give directions
  - facilitate discussions
  - present immediate feedback
Key Differences?

- Limited opportunities for real-time (synchronous) spontaneous interactions.

- Use of interactive technologies does not ensure interactions will occur.

- Interactions must be planned and sequenced as integral part of eLearning.
What do we know?

- One of most often discussed topics
- Enable instructors and learners to communicate and address individual needs and interests
- Reduce feelings of isolation & anonymity
- Tool for transforming teacher-directed to student-centered methods
- Defining characteristic & vital to DE (Moore, 1989)
- Single most important element (Kearsley, 1998)
What do we know?

Without interactions, instruction may simply become "passing on content as if were dogmatic truth, and the cycle of knowledge acquisition, critical evaluation and knowledge validation, that is important for the development of higher-order thinking skills, is nonexistent."

(Shale & Garrison, 1990, p. 29)
What do we know?

**Elemental Definition:**
Learner accessing a page of text via a web interface & reading some content.

(Carlson & Repman, 1999)

**Rigorous Definition:**
Five Criteria (a) interruptability, (b) graceful degradation, (c) limited look-ahead, (d) no default, and (e) seemingly infinite database.

(Lippman, 1988)
Frameworks (Communication-based)

- Student-Teacher
- Student-Student
- Student-Content
- Student-Interface
- Student-Instructional
- Student-Social
- Instructor-Support Staff
- Instructor-Peers
- Instructor-Organization

(Moore, 1989)
(Hillman, et. al., 1994)
(Carlson & Repman, 1999)
(Montera & Murphy, 2000)
Taxonomies (Purpose-based)

- Asynchronous communications
- Synchronous communications
- Browse and click
- Branch
- Track

- Interact with content
- Monitor and regulate
- Support performance

- Confirm
- Navigate
- Elaborate

- Coach
- Help
- Practice
- Feedback
  (breakthebarrier.com, 2001)

- Collaborate
- Converse
  (Northrup, 2001)

- Pace
- Inquire
  (Hannifin, 1989)
Taxonomies (Activity-based)

- Information Gathering
- Information Sharing
- Collaborative Problem Solving
  (Harris, 1995)

- Critical Thinking
- Creative Thinking
- Cooperative Learning
  (Bonk and Reynolds, 1977)
Taxonomies (Tool-based)

- Electronic mail and delayed messaging tools
- Remote access and delayed collaboration tools
- Real-time brainstorming and conversation tools
- Real-time text collaboration tools
- Real-time multimedia and/or hypermedia collaboration tools

(Bonk & King, 1998)
Taxonomies (Problem)

*Give some guidance & insights, but...*

- Fail to delimit relationships between classes of interactions.

- Fail to delineate interrelationships between interactions, instructional strategies and telecommunication technologies.

- Do not provide novices with sufficient detail (systematic procedures) to design and sequence interactions and design alternative e-learning environments.
Presentation Objectives

Given a set of objectives associated with an instructional unit or lesson:

1. Design and sequence e-learning interactions; and
Contents

- Posit framework that delimits relationships between interactions, instruction and technology.

- Situate framework within systematic process for designing e-learning interactions and alternative e-learning environments.
Definitions

-e-Learning – Learning that is facilitated through the predominately use of telecommunication technology (Hirumi, 2002).

-e-Learning materials – May be used in traditional f2f, hybrid and totally online environments.
Proposed Framework

Level III
Learner--Instruction Interactions

Level II
Learner--Human Interactions
   Learner--Instructor
   Learner--Learner
   Learner--Other
Learner--Non-Human Interactions
   Learner--Content
   Learner--Tool
   Learner--Environment

Learner--Interface Interactions

Level I
Learner--Self Interactions
Contents

(Posit framework that delimits relationships between interactions, instruction and technology.

Situate framework within instructional design process to provide systematic procedures for designing, sequencing and facilitating interactions.)
Context

Systematic Design Process

- Characterized by the use of orderly planning method
- Outputs of one task used as inputs to subsequent tasks
- Design and delivery based on targeted outcomes
- Iterative in nature
Context

Needs Assessment
Analysis Phase (Analysis Report)
• Goal Analysis
• Subordinate Skills Analysis

Design Phase (Instructional Treatment Plan)
• Goals & Objectives
• Assessment Method

Development Phase
• Flowcharts, Storyboards & Prototypes
• Formative Evaluation & Usability Tests

Implementation Phase

Summative Evaluation Phase
Instructional Strategy & Media Selection

Step 1. Select “grounded” instructional strategy
Step 2. Operationalize strategy
Step 3. Delineate Level II interactions
Step 4. Map tools to events
Step 5. Analyze planned interactions
Food for Thought

What are the differences between...

Information

Systemically-Designed Instruction

SME Design Approach
Food for Thought

Information
Expository text and other media designed to transmit a message from sender to receiver.

SME approach (Pseudo-Instruction)
Series of activities designed to stimulate learning based on past practices, opinions, fads, politics, etc.

Systematically Designed Instruction
Sequence of events based on combination of practical experience, theory & research.
Step 1: Select Grounded Strategy

(Handout #1 – Grounded Instructional Strategies)

- 9 Events of Instruction
- 8 Events for Student-Centered Learning
- Problem-Based Learning
- Simulation Model
- Inquiry Training
- Direct Instruction
- Inductive-Thinking
- Jurisprudential Inquiry
- WebQuests
Step 1: Select Grounded Strategy

Case-Based Reasoning
1. Present New Case/Problem
2. Retrieve Similar Cases
3. Reuse Information
4. Revise Proposed Solution
5. Retain Useful Experiences
Step 1: Select Grounded Strategy

SCenTRLE
1. Set Learning Challenge
2. Negotiate Goals and Objectives
3. Negotiate Learning Strategy
4. Construct Knowledge
5. Negotiate Performance Criteria
6. Assess Learning
7. Provide Feedback (Steps 1-6)
8. Communicate Results
Step 1: Select Grounded Strategy

Selection Criteria

- Goals and Objectives
  (Handout #2 – Taxonomies)
- Desired Environment
  (Handout #3 – Alternative Environments)
- Learner Characteristics
- Epistemological Beliefs
Step 1: Select Grounded Strategy

Teacher-Centered Learning

Student-Centered Learning

Knowledge

Experience

Teacher

Class of Students

Student-Centered Learning

Teacher-Centered Learning

Content

Technology

Instruction

Instructor

Community

Students
### Step 1: Select Grounded Strategy

#### Instructional Variables

<table>
<thead>
<tr>
<th>Environment</th>
<th>Learning Outcomes</th>
</tr>
</thead>
</table>
| • Students sit individually in rows, information presented primarily via lectures and reading assignments. | • Discipline-specific  
• Lower order thinking skills (e.g., recall, identify, define).  
• Memorization of abstract and isolated facts, figures and formulas. |

#### Instructional Approach

<table>
<thead>
<tr>
<th>Student Centered</th>
<th>Teacher Centered</th>
</tr>
</thead>
</table>
| • Interdisciplinary  
• Higher order thinking skills (e.g., problem solving)  
• Information processing skills (e.g., search for, access, organize, interpret, communicate information) | • Disciplinespecific  
• Lower order thinking skills (e.g., recall, identify, define).  
• Memorization of abstract and isolated facts, figures and formulas. |

<table>
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<th>Environment</th>
<th>Learning Outcomes</th>
</tr>
</thead>
</table>
| • Students work at stations, individually and in small groups, with access to electronic resources. | • Interdisciplinary  
• Higher order thinking skills (e.g., problem solving)  
• Information processing skills (e.g., search for, access, organize, interpret, communicate information) |
Step 1: Select Grounded Strategy

<table>
<thead>
<tr>
<th>Instructional Variables</th>
<th>Teacher Centered</th>
<th>Student Centered</th>
</tr>
</thead>
</table>
| Goals & Objectives      | Teacher prescribes goals and objectives  
Based on prior experiences, past practices, and state and/or locally mandated standards.  
| Instructor works with students to determine learning strategies  
Self-paced, to meet individual needs  
Student given direct access to multiple resources (e.g., books, online databases, community)  |

| Instructional Strategy  | Prescribed & directed by teacher; Group-paced, designed for “average” student  
Information organized and presented primarily by teacher (e.g., lectures) with some supplemental reading assignments  
| Teacher works with students to determine learning strategies  
Self-paced, to meet individual needs  
Student given direct access to multiple resources (e.g., books, online databases, community)  |

| Assessment              | Assessments used to sort students  
Paper & pencil exams used to assess students acquisition of information  
Teacher sets performance criteria for students  
Students left to find out what teacher wants  
| Assessment integral part of learning  
Performance based, used to assess students ability to apply knowledge  
Students work with teachers to define performance criteria  
Student develop self-assessment and peer assessment skills  |
### Step 1: Select Grounded Strategy

#### Teachers’ Role
- Finds, organizes and presents information
- Acts as gatekeeper, controlling access to knowledge
- Teacher directs learning

#### Students’ Role
- Expect teachers to teach
- Focus on minimum requirements to pass test/class
- Passive recipients of information
- Reconstructs knowledge and information

#### Instructional Variables

<table>
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<tr>
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<th>Instructional Approach</th>
<th>Teacher Centered</th>
<th>Student Centered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers’ Role</td>
<td></td>
<td>Helps find, organize, and provide multiple means for accessing information</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Acts as facilitator, helps access, interpret &amp; apply</td>
<td>Teacher facilitates learning</td>
</tr>
</tbody>
</table>

#### Students’ Role
- Students take responsibility for learning
- Focus on learning outcomes and processes
- Active knowledge seekers
- Constructs knowledge and meaning
Instructional Strategy & Media Selection

Step 1. Select “grounded” instructional strategy
Step 2. Operationalize strategy
Step 3. Delineate Level II interactions
Step 4. Map tools to events
Step 5. Analyze planned interactions
Step 2: Operationalize Strategy

Common Learning Experiences
- Listen to lectures
- Read journal articles or textbooks
- Complete handouts/worksheets
- Conduct observations
- Conduct experiments
- Writing reflective papers
- Participate in class discussion
- Develop and analyze case studies
- Interview others
- Visit community resource centers
- Conduct library research
- Visit places of interest
- Participate in Q&A sessions
- Watch demonstrations
- Examine and/or assess other work
- Conduct surveys
- Watch film or slide show
- Attend guest lecture
- Handle manipulatives
- Complete individual or group project
- Interact with laserdisc program
- Analyze current events
- Generate and manipulate a database
- Participate in a debate
- Participate in a panel discussion
- Interact with computer simulation
- Manipulate a spreadsheet
- Make oral/graphic presentation
- Write paper
- Interact with educational software
Step 2: Operationalize Strategy

**InterActivities**
(Handout #4: InterActivities Part I & II)

- Information Gathering
- Information Sharing
- Collaborative Problem Solving
- Critical and Creative Thinking
Step 2: Operationalize Strategy

*Grounded Instructional Events for...* (Handout #5: Grounded Instructional Events)

- Verbal Information
- Concepts
- Procedures, Rules and Principles
- Problem Solving
- Cognitive Strategies
- Attitudes
## Step 2: Operationalize Strategy

(Handout #6 Table 1)

<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Set Challenge</td>
<td>✈ What is “Authentic” Problem?</td>
</tr>
<tr>
<td></td>
<td>✈ Why is it relevant/important?</td>
</tr>
<tr>
<td></td>
<td>✈ How will problem be communicated?</td>
</tr>
<tr>
<td>2. Negotiate Objectives</td>
<td>✈ What are required/desired SKA?</td>
</tr>
<tr>
<td></td>
<td>✈ How will SKA be discussed?</td>
</tr>
<tr>
<td></td>
<td>✈ How will learners identify required SKA?</td>
</tr>
<tr>
<td></td>
<td>✈ How will instructor confirm appropriateness?</td>
</tr>
<tr>
<td>3. Negotiate Strategy</td>
<td>✈ What are strategies and available resources?</td>
</tr>
<tr>
<td></td>
<td>✈ How will strategies &amp; resources be discussed?</td>
</tr>
<tr>
<td></td>
<td>✈ How will learners propose strategies?</td>
</tr>
<tr>
<td></td>
<td>✈ How will instructor confirm appropriateness?</td>
</tr>
<tr>
<td>4. Construct Knowledge</td>
<td>✈ Learner applies &amp; records strategies</td>
</tr>
<tr>
<td></td>
<td>✈ How will instructor monitor progress?</td>
</tr>
</tbody>
</table>

### Level of Detail?
- Now or Later?
- Developers?
Step 2: Operationalize Strategy

(Handout #6 Table 1)

<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Negotiate Criteria</td>
<td>✈ How will learner identify criteria?</td>
</tr>
<tr>
<td></td>
<td>✈ How will learner propose criteria?</td>
</tr>
<tr>
<td></td>
<td>✈ How will instructor confirm appropriateness?</td>
</tr>
<tr>
<td>6. Assess Learning</td>
<td>✈ When (entry, pre, practice, post)?</td>
</tr>
<tr>
<td></td>
<td>✈ How (conventional, checklist, rubric)?</td>
</tr>
<tr>
<td></td>
<td>✈ Who (Instructor, Peer, Self)?</td>
</tr>
<tr>
<td>7. Provide Feedback</td>
<td>✈ How and who will provide feedback through Events 1-6?</td>
</tr>
<tr>
<td>8. Communicate Results</td>
<td>✈ How and to whom will results be communicated?</td>
</tr>
</tbody>
</table>

Level of Detail?
- Now or Later?
- Developers?
Step 2: Operationalize Strategy

Authentic Integration of Technology

• Programming
• Drill & Practice, Tutorials, Games
• Basic Computer Literacy (Productivity Tools)
• Telecommunications
• Authentic Use
Instructional Strategy & Media Selection

Step 1. Select “grounded” instructional strategy

Step 2. Operationalize strategy

Step 3. Delineate Level II interactions

Step 4. Map tools to events

Step 5. Analyze planned interactions
Step 3: Delineate LII Interactions

Level III

Learner--Instruction Interactions

Level II

Learner--Human Interactions

Learner--Non-Human Interactions

Learner--Instructor
Learner--Learner
Learner--Other
Learner--Content
Learner--Tool
Learner--Environment

Learner--Interface Interactions

Level I

Learner--Self Interactions
## Step 3: Delineate LII Interactions

*(Handout #6 Table 1)*

<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
<th>Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Set Challenge</td>
<td>✂️ Who and How?</td>
<td>Student-Content Student-Instructor</td>
</tr>
<tr>
<td>2. Negotiate Objectives</td>
<td>✂️ Who and How?</td>
<td>Student-Instructor</td>
</tr>
<tr>
<td>4. Construct Knowledge</td>
<td>✂️ Who and How?</td>
<td>Student-Environment Student Community</td>
</tr>
<tr>
<td>5. Negotiate Criteria</td>
<td>✂️ Who and How?</td>
<td>Student-Instructor</td>
</tr>
<tr>
<td>6. Assess Learning</td>
<td>✂️ Who and How?</td>
<td>Student-Instructor Student-Student</td>
</tr>
<tr>
<td>7. Provide Feedback</td>
<td>✂️ Who and How?</td>
<td>Student-Instructor Student-Student</td>
</tr>
<tr>
<td>8. Communicate Results</td>
<td>✂️ Who and How?</td>
<td>Student-Instructor Student-Student</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Student-Community</td>
</tr>
</tbody>
</table>
Instructional Strategy & Media Selection

Step 1. Select “grounded” instructional strategy
Step 2. Operationalize strategy
Step 3. Delineate Level II interactions
Step 4. Map tools to events
Step 5. Analyze planned interactions
Step 4: Map Tools

Educational Media (1970s)
- Handouts
- Film/Strips
- Overhead Trans.
- Ed. Television

Decade of Personal Computers (1980s)
- Drill and Practice
- Tutorials/Simulations

Decade of Electronic Networks (1990s)
- Email
- Newsgroups
- Interactive Television
- Books, Articles, Papers
- Slides
- Radio
- Audio/Video Cassettes
- Games
- Productivity Tools
- Listservs
- World-Wide-Web
- Desktop Conferences
Step 4: Map Tools

- What is the nature of the educational experience? Does learners need to see graphics, motion video, listen to audio, etc.?
- Is face-to-face interactions necessary? If so, when? What other interactions (student-student, student-content, student-community) are required?
- What is the configuration of your learning group? Is there one remote site in a classroom? Individual participants from home?
- What kind of budget do you have?
- What kinds of technologies and human resources are available? How much time do you have to prepare course materials?
# Step 4: Map Tool

**Handout #6 Table 1**

<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
<th>Interaction</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Challenge</td>
<td>✎ Who and How?</td>
<td>✎ Student-Content ✎ Student-Instructor</td>
<td>✎ Web ✎ F2F</td>
</tr>
<tr>
<td>2. Objectives</td>
<td>✎ Who and How?</td>
<td>✎ Student-Instructor</td>
<td>✎ Email/BBS</td>
</tr>
<tr>
<td>3. Strategy</td>
<td>✎ Who and How?</td>
<td>✎ Student-Instructor</td>
<td>✎ Email/BBS</td>
</tr>
<tr>
<td>4. Knowledge</td>
<td>✎ Who and How? ✎ Student Community</td>
<td>✎ Student-Environment ✎ Student-Environment</td>
<td>✎ Depends on individual s</td>
</tr>
<tr>
<td>5. Criteria</td>
<td>✎ Who and How?</td>
<td>✎ Student-Instructor</td>
<td>✎ Email</td>
</tr>
<tr>
<td>6. Assess</td>
<td>✎ Who and How? ✎ Student-Student</td>
<td>✎ Student-Instructor ✎ Student-Student</td>
<td>✎ Email</td>
</tr>
<tr>
<td>7. Feedback</td>
<td>✎ Who and How?</td>
<td>✎ Student-Instructor ✎ Student-Student</td>
<td>✎ BBS ✎ Email</td>
</tr>
<tr>
<td>8. Results</td>
<td>✎ Who and How?</td>
<td>✎ Student-Instructor ✎ Student-Student ✎ Student-Community</td>
<td>✎ Web ✎ Email ✎ F2F</td>
</tr>
</tbody>
</table>
Instructional Strategy & Media Selection

Step 1. Select “grounded” instructional strategy

Step 2. Operationalize strategy

Step 3. Delineate Level II interactions

Step 4. Map tools to events

Step 5. Analyze planned interactions
# Step 5: Analyze Interactions

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<tr>
<th>Event</th>
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<th>Tools</th>
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</table>
| 1. Challenge | ✿ Who and How? | ✿ Student-Content  
✿ Student-Instructor | ✿ Web  
✿ F2F |
| 2. Objectives  | ✿ Who and How? | ✿ Student-Instructor  
✿ Student Community | ✿ Depends on individual s |
| 5. Criteria    | ✿ Who and How? | ✿ Student-Instructor | ✿ Email |
| 6. Assess      | ✿ Who and How? | ✿ Student-Instructor  
✿ Student-Student | ✿ Email |
| 7. Feedback    | ✿ Who and How? | ✿ Student-Instructor  
✿ Student-Student | ✿ BBS  
✿ Email |
| 8. Results     | ✿ Who and How? | ✿ Student-Instructor  
✿ Student-Student  
✿ Student-Community | ✿ Web  
✿ Email  
✿ F2F |
Step 5: Analyze Interactions
(Handout #6 Table 2)

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Quan.</th>
<th>Quality</th>
<th>Design Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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What Next?

Needs Assessment
Analysis Phase (Analysis Report)
- Goal Analysis
- Subordinate Skills Analysis
Design Phase (Instructional Treatment Plan)
- Goals & Objectives
- Assessment Method
Development Phase
- Flowcharts, Storyboards & Prototypes
- Formative Evaluation & Usability Tests
Implementation Phase
- Learner Analysis
- Context Analysis
- Instructional Strategies
- Media Selection
Summative Evaluation Phase
Summary

- Problems with current online programs
- Difficulties with e-Learning
- Current Definitions and Frameworks
- Proposed 3 Level Framework
- Proposed 5 Step Systematic Process
- Focused on model for establishing SCenTRLE
- Next Steps (Development)