# Interactive Learning System Design Booklet

## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 1</td>
<td>Description of an Interactive Learning System and Environment</td>
</tr>
<tr>
<td></td>
<td>Specifications</td>
</tr>
<tr>
<td></td>
<td>Examples</td>
</tr>
<tr>
<td>Section 2</td>
<td>Content (knowledge) of the System, Knowledge Management</td>
</tr>
<tr>
<td></td>
<td>Knowledge Map Creation Process</td>
</tr>
<tr>
<td></td>
<td>Slide Show Presentations</td>
</tr>
<tr>
<td></td>
<td>Interactive Models</td>
</tr>
<tr>
<td></td>
<td>Glossary</td>
</tr>
<tr>
<td></td>
<td>Page Design</td>
</tr>
<tr>
<td>Section 3</td>
<td>Learning System</td>
</tr>
<tr>
<td></td>
<td>Activity Setup</td>
</tr>
<tr>
<td></td>
<td>Links to Information</td>
</tr>
<tr>
<td></td>
<td>Links to Prior Knowledge</td>
</tr>
<tr>
<td></td>
<td>Links to Glossary</td>
</tr>
<tr>
<td></td>
<td>Critical Thinking Activities</td>
</tr>
<tr>
<td></td>
<td>Computer oriented exercises</td>
</tr>
<tr>
<td></td>
<td>Problem Solving projects</td>
</tr>
<tr>
<td></td>
<td>Modeling of Concepts, Processes, Tools, &amp; Ways of Being</td>
</tr>
<tr>
<td>Section 4</td>
<td>Learning Community</td>
</tr>
<tr>
<td>Section 5</td>
<td>Assessment System</td>
</tr>
<tr>
<td></td>
<td>Pre-assessment</td>
</tr>
<tr>
<td></td>
<td>Post assessment</td>
</tr>
<tr>
<td></td>
<td>Formative assessment</td>
</tr>
<tr>
<td></td>
<td>Assessment of activity performance</td>
</tr>
<tr>
<td></td>
<td>Assessment of process skills</td>
</tr>
<tr>
<td></td>
<td>Journal writing-writing to learn</td>
</tr>
<tr>
<td></td>
<td>Journal writing-structure self-reflective thought</td>
</tr>
<tr>
<td>Section 6</td>
<td>Evaluation System</td>
</tr>
<tr>
<td>Section 7</td>
<td>Learning and Professional Tools</td>
</tr>
<tr>
<td>Section 8</td>
<td>Management System for Formal Instruction</td>
</tr>
</tbody>
</table>
Section 9 Assessing the Quality of ILS Design................................................................. 12
Performance Criteria
Assessment tools

Section 10 Customizing an ILS to your Context............................................................... 14

Section 11 Facilitating an ILS Implementation............................................................... 14

Section 12 Development Process ................................................................................... 14
Development team design
Development Plan

Section 13 Resources to Support Development of an ILS ........................................... 15
Tools
Faculty Development
Technical Support
Implementation Resources
Marketing of Products
Section 1 – Description of an Interactive Learning System and Environment

The design of an Interactive Learning System should be constructed using various components. These components can be categorized according to the following general areas.

Knowledge System *(content, information system)*
Content which includes multimedia, search engine, hyperlinks, glossary, external links. A database is primary.

Learning System *(curriculum, active learning system)*
Curriculum which includes skill exercises, problems, essays, models, critical thinking questions, etc.

Learning Environment *(learning communities communication system)*
Supports a team format with chat rooms, threaded discussions, an e-mail system.

Assessment System
Ongoing feedback is provided to increase learning and growth in the form of self-assessments, journal writing, peer assessments, activity assessments, institutional assessment, instructor assessments, portfolios, and direct feedback.

Evaluation System
Measures the level of learning outcomes on individual basis with immediate, formative or summative feedback.

Management System *(measurement system)*
Supports the facilitator (of the learning experience) with student performance tracking and student records; a self-running system.

Adapting System
Allows for flexibility to transfer to various learning contexts.

Tool Library *(professional tool system)*
Creates the environment to practice using professionals tools for graphing, table editing, symbolic processing, documentation, and drawing.

Security System
Keeps personal information secure. Limits access to qualified persons.

Help System
Answers key questions and teaches the facilitator and user of how to use the system.
System characteristics of an ILS

- video to support lectures
- Internet access
- access to the ILS through the Internet
- pre-assessment system (such as Math and Graphing Skills)
- post-assessment system (tracking of mastery learning)
- contains a set of tool libraries
- a “scratchpad” environment exists for scripts
- contains simulations and models
- has the capability to run slideshows
- has a text-management system and hyperlink capability
- has a master “control box”
- has a (pull down) menu system
- has a help system
- a state variable data base system to track location
Features of an ILS

- friendly user interface
- platform independent
- synchronous and asynchronous
- low bandwidth
- learner controlled
- very interactive
- supports all learning styles/modulates
- focused on skill development and critical thinking and problem solving

Specifications required for an ILS

- fancy graphical cover (book cover and home page)
- a menu of activities (Internet mapping)
- a preface (instructions for using the system)
- a demonstration for marketing purposes along with introductory materials and a tutorial
- a pre-assessment system
- a post-assessment system for mastery
- a record keeping and monitoring system
- an administrator entry point for continual monitoring
Section 2 – Content (Knowledge) of the System, Knowledge Management

Information System

- easily accessible by author and user
- query capable
- effective search engine
- hyperlinks

Design Issues of Interactive Textbook

Help – link to search, have overview of use, list of commands, good looking, linked text, choices for links, complete text before file made

Search – can choose by words, Table of Contents entry, concept map

Speed – make sure appropriate part of book is accessible, have graphics appropriate for computer used, limit number of links at one time

Ease of Use – short-term, understandable link, overview in book, overview in help, strong help long term-obtain global consensus on keystrokes for use for these types of things

Key Performance Criteria for an Interactive Textbook

1. graphics tied to text
   - links to pictures (photographs)
   - links to slide show (set of photographs)
   - links to video (explanation - lecture)
   - links to graphical interactive model
   - simulator
2. links between text to text to graphics to animation
   - links are not just one-way - text can be linked from the above forms of graphics
   - links must be constant to key fundamentals tools (Post Its, Notetaker, Tester, Tool Kit, Assessor)
3. ease of use GUI
4. links to tools and resources
5. humor
6. color
7. speed
8. illustrative explanation
9. current, accurate, and revisable
10. additional examples
11. well-written and customizable
12. system entry at various levels
13. an entry of sophistication
14. an online help system.
15. flexible, easy to distribute
Section 3 – Learning System, Curriculum

Criteria for the Learning System

Active Learning System
- interesting and motivating (stories)
- promotes critical thinking and problem solving
- Individualize feedback
- user-friendly interface

Learner Control
- learner can access any portion of system (control box)
- learner can define tasks
- interactivity, especially in the models

Activities Design Specifications
- creative and engaging
- time management
- structured activities
- need clear expectations/ milestones/ goals
- hierarchy of activities
- clear links to text but goes beyond it
- humorous
- quality models you can play with
- can be customized by students and faculty

Design for Activities

Page 1: Cover Sheet for each activity (Graphical Picture, Title, Why)
Page 2: Glossary
Page 3: Pre-assessment with backward mapping with some diagnostics for improving upon weak areas
Page 4: Concept Map/Process Map/Tool Map/Context Map with current activity in the middle of the appropriate map
Page 5: Objectives/Criteria, form with criteria listed space for description of how activity fulfills activity objectives
Page 6: Lecture - video
Page 7: Lecture - text pages, activity overlay within text
Page 8: Model
- Computer model for concepts
- Methodology for a process
- Simulation/Tutorial for a Tool
- Story for a context system
Page 9: Resources, including links to other activities
Page 10: Activity Plan
Page 11: Slide Show - sequence of graph/text pages
### Specifications for an Activity Design

**Cover**  
graphic artist  
visual representation of knowledge  
marketing piece  
copyright and credits  
access point (e-mail, etc.)  
splash screen

**Video**  
video display utility  
video display, small screen and large screen  
20-min video segments  
- 15 min intense presentations  
- 5 min discussion by learners (raise questions)

Need criteria for quality  
Shift graphics, etc., to slideshow

**Slideshow**  
multimedia notes (text, graphics, and Internet pages)  
constrained to size fitting in browser w/out scrolling  
replace word by graphics, 80% reduction of words  
optional audio commentary  
graphics may be interactive (graphs, simulations, etc.)  
hyperlink to other slides, models...

**Annotated Bibliography**  
minimum 5 references for each activity, core reference papers  
recent research  
current projects (NSF, NIH, etc.)  
other write-up available

**Glossary**  
dictionary  
glossary (including criteria for levels of performance)

### Section 4 – Learning Community

(to be developed)
Section 5 – Assessment System

Assessment System
- Direct immediate feedback
- Systematic method for peers to give feedback

Pre-Assess
- Skills for life
- Knowledge skills
- Discipline process skills
- Tool skills

Include tutorial for improvement
Backward mapping to activities
Collect as group for pre-assessment in course
Measure added value
Algorithmically developed (limited database, infinite questions)
Allow for continued use (always fresh)
Performance documented in database
Useable by groups

Design for Assessment
- pre-test and post-test
- record of student self-assessment
- documents level reached while still letting you continue
- assessment of learning skills
- define what process skills are to be obtained

Assessment
1. a historical record of what a student has accomplished over a period of time
2. optional mastery learning reportable to facilitator
3. exemplars and feedback
4. student self-assessment
5. student assessment of the text
6. levels of analysis of performance from the raw data
7. Bloom’s levels
8. assessment of process skills
9. pre-assessment
10. more assessment than as an evaluative tool
11. strong record
Section 6 – Evaluation System
To be developed: levels of security, authority capability, quality of questions

Section 7 – Learning and Professional Tools

1. Data Base System
   - complete linkages to professional data of discipline
   - teach students the underpinnings of the professional databases
   - expandable - allows for new links

2. Tools System
   - ease of use
   - comprehensive
   - supports pedagogical goals

3. Learning Community communication system
   - ease of use
   - common index
   - peer assessment
   - peer help

4. Help System
   - specific concrete instructions
   - easily accessed
   - individualized contextualize expert tutor

5. Glossary

6. Post It – note system

Issues to consider:
- What can the system do?
- What are its limitations, what it can’t do?
- Learning curve, required effort in learning
- Required effort to use
- Future potential for the tool
- Risks in reliability, portability, and integratability

Tools/Resources
- models
- simulations
- your own software
- Knowledge maps
- problem solving environment
- teamware software
- glossary
- connect to Internet (email)
Section 8 – Management System for Formal Instruction

1. **Platform Independence**
   CPU, monitor, ROM drive
   downward compatible for four years
   synchronous, asynchronous

2. **Band Width**
   Low band, adjustable downward to 28.8

3. **Very Interactive**
   rapid feedback
   interactive components - images and graphics
   inquiry by both system and learner

4. **Security System**
   learners individual stamp capability
   links to standard email
   a batch mode

5. **Management System**
   individual information
   - time on task
   - time on line
   - quality of work

6. **System information**
   - performance by module and question
   - integrated grading system
   - on-line rosters and grading system
Section 9 – Assessing an Interactive Learning System

Criteria and Factors

1. Authoring System for expanding capability by educator
   - ease of use
   - tools for feedback
   - allows for collaboration of fellow authors
   - provides quick to implement templates for additions

2. Information System
   - easily accessible by author & user
   - query capable
   - effective search engine
   - hyperlink

3. Data Base System
   - complete linkages to professional data of discipline
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   - specific concrete instructions
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7. Evaluation System
   - levels of security
   - authority capability
   - quality of questions
8. Active Learning System
   - interesting and motivating
   - promotes critical thinking and problem solving
   - individualized feedback
   - user-friendly interface

9. Platform Independence
   - CPU, monitor, ROM drive
   - downward compatible for 4 years
   - synchronous, asynchronous
   - band width, low band, adjustable downward to 28.8

10. Learner Control
   - learner can access any portion of system (control box)
   - learner can define tasks
   - interactivity especially in the models

11. Very Interactive
   - rapid feedback
   - interactive components - images and graphics
   - inquiry by both system and learner

12. Assessment System
   - direct immediate feedback
   - systematic method for peers to give feedback

13. Security System
   - learner individual stamp capability
   - links to standard email
   - a batch mode

14. Management System
   - individual information
     - time on task
     - time on line
     - quality of work
   - system information
     - performance by module and question
     - integrated grading system
   - on-line rosters and grading system
   - students has their access and perspective
Section 10 – Customizing an ILS for Your Context

Authoring System for expanding capability by educator
   Ease of use
   Tools for feedback
   Allows for collaboration of fellow authors
   Provide quick to implement templates for additions

Section 11 – Facilitating an ILS Implementation

1. Pre-assessment Tool
2. Mastery Looking
3. Process View
4. Documentation of Performance
5. Dialog system

Section 12 – Development Process, Plan and Team Design
(to be developed)
### Section 13 – Resources to Support Development of an ILS

**Tools**

1. **Authoring Shell**  
   Director, Authorware, Toolbook, Supercard, Browser
2. **Web Base**  
   HTML, Homesite, Visual Page, Front Page, Fusion, Go Live, Pagemill, Home Page
3. **DHTML**  
   Dream/Weaver
4. **JAVA**  
   Visual Cafe, Visual J, Roaster
5. **Streaming video**  
   Vivo, Netshow, Vxtreme
6. **Utilities**  
   Web Painter, VRML
7. **Photo Editing**  
   Photoshop, Painter
8. **Video Editing**  
   Premiere, After Effects
9. **Utilities**  
   Media Cleanner
10. **Video In**  
    Video Fusion, Firewise
11. **Sound Editing**  
    Sound Edit, Sound
12. **Drawing Program**  
    Canvas, Illustrator, Freehand, Corel Draw
13. **Animation**  
    Strata Studio Pro, Infiniti 3D

**What is missing?**

- Curriculum -  
- Assessment  
- Expert systems: tutorial  
- Modelers